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The purpose of this study was to test the efficacy of traditional voice therapy approaches in combination with singing exercises and Melodic Intonation Therapy (MIT) to aid male-to-female transgender individuals gain a more feminine sounding voice. Participants from this study were recruited from a transgender support group in Greensboro, North Carolina. Six male-to-female individuals ranging in age from 37 to 63 years volunteered to participate in the study. Participants were randomly divided into two groups: Three individuals received traditional voice therapy plus feminine language structures/vocabulary and nonverbal communication (Group 1), while the remaining three received traditional voice therapy plus singing exercises and MIT (Group 2). All participants received traditional voice therapy techniques. Quantitative results suggested increased Speaking Fundamental Frequencies (SFFs) for participants in both groups, however, a slightly higher SFF was present in Group 2. Descriptive analysis of the results showed that by the study's end, all participants presented with self-voice ratings (1-7 scale) that were higher than the ratings given by the participants at the beginning of the study. Also, at the end of the study, all four judges (two first-year speech-language pathology graduate students and two random volunteers) rated the participants with voice ratings that were above the ratings at the beginning of the study.

THE EFFECTS OF SINGING EXERCISES AND MELODIC INTONATION
THERAPY (MIT) ON THE MALE-TO-FEMALE
TRANSGENDER VOICE

by

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APPROVAL PAGE

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CHAPTER I

INTRODUCTION

The term *transgender* is a relatively new term used to describe an individual who appears as, wishes to be considered as, or has undergone surgery to become a member of the opposite sex or gender (American Heritage Dictionary, 2000). According to Reeder (1996), although many people use the terms *sex* and *gender* interchangeably, the two words have distinct meanings. *Sex* is a term based on biology and assigned on the basis of criteria such as chromosomal pattern and genitalia. *Gender* is socially and psychologically constructed and used to identify a person's overall presentation, physical characteristics, inner feelings and behavior, and is based upon society's classifications of masculinity or femininity or in certain cases as neither or both of these. According to Wood (2003), *gender* is a more complex term than *sex*; it is acquired and learned through social interactions and it may change over time. *Gender* is a relational concept, because femininity and masculinity exist in relation to each other. As meanings of one gender change, so do meanings of the other. Generally, *sex* and *gender* co-occur so that most men are primarily masculine and most women are primarily feminine.

In the case of transgender individuals, however, sex and gender are inconsistent. These individuals believe that they are trapped in the body of one sex but identify strongly with the other sex (Fausto-Sterling, 2000; Herdt, 1996; Money, 1988). They believe their biological sex is wrong – that they are really women trapped in men's

bodies or men trapped in women's bodies (Howey, 2002; Sheridan, 2001; Stryker, 1997, 1998). Transgender people challenge the idea that sex and gender are dualities – that is, that male and female, masculine and feminine are opposite, stable, and the only two possibilities (Namaste, 2000).

Other terms that deserve attention are *gender identity*, *gender expression*, and *gender dysphoria*. According to Andrews (1999), *gender identity* refers to the internal psychological belief of an individual as to which of the two gender categories –masculine or feminine- he or she belongs or ought to belong. A person's *gender expression* refers to males expressing their femininity and females expressing their masculinity as well as females expressing their femininity and males expressing their masculinity. The term *gender expression* also refers to how much of an individual's true gender identity is revealed to society. *Gender dysphoria* refers to the discomfort that an individual experiences with socially and culturally assigned gender roles. Dysphoria is derived from a Greek word meaning “hard to bear” (Brown & Rounsley, 1996, p.10). Gender dysphoria is sometimes used as a synonym for *transsexualism* because it refers to the discomfort and distress that transgender individuals experience.

The diagnosis of *transgenderism* was first introduced in the Diagnostic and Statistical Manual of Mental Disorders - Third Edition - (DSM-III) in 1980 for gender dysphoric individuals who demonstrated at least two years of continuous interest in transforming the sex of their bodies and their social gender status (*Appendix A*). According to Conway (2002), during this past decade the word *transgender* has mainly described all persons whose gender identity differs from what society customarily

expects from them. The term *transgender*, therefore, includes among others, people who are called or who call themselves transsexuals, transvestites and crossdressers (*Appendix B*).

This study will focus on male-to-female transgender individuals. Although these individuals comprise a small group of the population, the number is increasing steadily. The prevalence of the male-to-female transgender persons is currently at a ratio of 1:1500 adult males or more (Conway, 2002). According to experts in sexual and gender identity disorders mentioned in the Diagnostic and Statistical Manual of Mental Disorders -Fourth Edition - (DSM-IV) (2000), there are no recent epidemiological studies to provide data on prevalence of Gender Identity Disorder. Data from smaller countries in Europe with access to total population statistics and referrals suggest that roughly 1 in 30,000 (1:30,000) adult males and 1 per 100,000 (1:100,000) adult females seek sex-reassignment surgery (SRS). According to Conway (2002), these estimations seem extremely low when at present 800-1000 Male-to-Female SRS operations are performed in the U. S. each year, and many or more are performed on U.S. citizens abroad. Thus, approximately 1500 to 2000 Male-to-Female SRSs are completed per year on U.S. citizens and residents.

As the prevalence of transgender individuals increases, so does the need for professionals who can treat these individuals. Such professionals may include medical personnel, psychologists, counselors, speech-language pathologists, social workers, and others. According to Freidenberg (2002), transgender individuals increasingly represent a small percentage of the caseload of speech-language pathologists with a specialty in

voice disorders. Unfortunately very little research exists on the male-to-female transgender voice. A few studies have evaluated acoustic and perceptual measures of the male-to-female transgender voice (Bralley, Bull, Gore, & Edgerton, 1978; Challoner 1986; Spencer 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990; Gunzburger 1995; Oates & Dakakis, 1997; Gelfer & Schofield, 2000). Even fewer studies (Kalra 1977; Hooper 1985; Mount & Salmon, 1988; Gelfer 1999; De Bruin, Coerts, & Greven, 2000) report beneficial effects of voice therapy on the male-to-female transgender voice.

Currently, there is no research to suggest the use of specific voice therapy approaches in combination with singing exercises and/or Melodic Intonation Therapy (MIT) for male-to-female individuals. This study will focus on the benefits of voice therapy on the male-to-female transgender voice when combined with singing interventions as well as MIT. Singing exercises in combination with MIT should help create a more musical and thus, a more feminine sounding voice. Andrews (1999) suggests that for male-to-female individuals seeking voice therapy, pitch level is actually less important than pitch variability or the musicality of the voice pattern. MIT primarily involves speaking in an intoned manner while singing involves great pitch variability as well as a legato vocal pattern and increased duration of some vowels. According to speculations made by experts, these musical parameters may be helpful in establishing a feminine sounding voice.

I. Objective and Specific Aims

The objective of this study was to test the efficacy of traditional voice therapy approaches in combination with specific singing exercises as well as Melodic Intonation

Therapy (MIT) in an attempt to aid male-to-female transgender individuals in producing a more feminine sounding voice. To achieve this objective, the specific aims of the study were the following:

1. To quantify the effects of traditional voice therapy on obtained voice evaluation measures in male-to-female individuals (Group 1) and compare those results with the effects of traditional voice therapy in combination with singing exercises and MIT interventions on obtained voice evaluation measures in male-to-female individuals (Group 2).
1. To assess the efficacy of traditional voice therapy on participants' perceptions of a feminine sounding voice pre- and post- training (Group 1) and compare those results with participants' perceptions receiving traditional voice therapy in combination with singing exercises and MIT pre- and post- training (Group 2).
1. To assess the efficacy of traditional voice therapy on listeners' perceptions regarding a feminine vs. a masculine sounding voice pre- and post- training and compare those results with listeners' perceptions regarding a feminine vs. a masculine sounding voice of participants receiving traditional voice therapy in combination with singing exercises and MIT pre- and post- training.

II. Research Questions

Two main research questions were posed in this study:

1. Based on objective and subjective measures, does traditional voice therapy increase the degree of femininity in male-to-female transgender speakers?

1. Based on objective and subjective measures, does the inclusion of singing exercises and Melodic Intonation Therapy (MIT) further increase the degree of femininity in male-to-female transgender speakers?

III. Assumptions

Several assumptions have been made about the specific therapy approaches used in this study:

1. All of the participants will be able to provide the examiner with reliable self-perceptions regarding their voice, during pre- and post- training. This information will be documented via individual interviews that will occur pre- and post-training.
1. All of the participants will be able to learn and maintain the new voice therapy techniques taught during a consecutive 12-week period.
1. All of the participants will be able to practice the specific vocal techniques at home in order to learn and be able to adapt to their new feminine sounding voice.
1. The examiner will be able to effectively teach the new vocal techniques and behaviors to all participants during the 12-week therapy period.
1. No major differences exist between male-to-female transgender participants receiving group voice therapy and male-to-female transgender participants receiving individual voice therapy. This particular information has not been researched and, thus, is currently unavailable.

1. No major quantitative and/or qualitative differences exist between voice measures during reading and voice measures during conversation. The particular information has not been researched and, thus, is currently unavailable.

IV. Limitations

The small sample size is a limitation. The principal investigator will recruit participants from a transgender support group and by word of mouth. Some transgender individuals may not seek voice therapy because of the unique nature of their voice disorders, for example, they may feel embarrassed or think that their vocal characteristics are so masculine that they may be extremely difficult to change. This limitation may decrease the sample size of the study and thus decrease the study's power (Howell, 2004).

CHAPTER II

REVIEW OF THE LITERATURE

I. Transgender Voice

According to Boone (2000) in female-to-male transgender persons, a lower pitch can be usually achieved through hormonal therapy; testosterone has the effect of thickening the vocal folds and thus, lowering vocal pitch. The female-to-male individuals, therefore, rarely require the services of a speech-language pathologist.

Professionals who work with male-to-female transgender clients, and the clients themselves, report that changing the speech (including voice) and language characteristics prove to be the most problematic masculine characteristics and the ones in need of professional help (Hooper, 2000). For most clients the most important initial treatment goal is to raise speaking fundamental frequency quite markedly (Gelfer, 1999). According to Boone (1997), pitch is a key element of one's voice "fingerprint," one of the characteristics that makes one's voice distinctively unique. Even without visual cues, voice pitch helps to immediately identify whether the speaker is male or female. Although many transgender individuals indicate that changing their pitch level is their most important goal, the pitch level is actually less important than is pitch variability or the musicality of the voice pattern (Andrews, 1999).

1. *Pitch and Pitch Variability*

Early clinicians and researchers in gender/voice change reported selecting target Speaking Fundamental Frequencies (SFFs) for their male-to-female clients of approximately 200 Hz (Kalra, 1977; Bralley, Bull, Gore, & Edgerton, 1978; Mount and Salmon, 1988). It should be noted that most of this literature was based on single subjects engaged in treatment programs. More extensive research of transgender voice (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990) consistently has indicated that an individual's SFF must be at least 160-165 Hz or higher for the voice to be identified as belonging to a female. For Wolfe et al. (1990) and Gelfer and Schofield (2000), the mean SFFs of female-perceived transgender individuals were 172 Hz and 187 Hz, respectively, with the higher SFFs in both studies approximating 200 Hz. SFFs below 165 Hz were consistently identified as male voices. Studies that have investigated listeners' perceptual judgments of average pitch support these acoustic findings; voices identified as female are consistently higher than those identified as male (Oates and Dacakis, 1997). Table 1, developed by Oates and Dacakis (1997), summarizes typical fundamental frequencies and overlap between males and females.

Table 1. **Frequency range overlap for males and females** (Oates and Dacakis, 1997).

Gender	Typical Fundamental Frequency (In Hertz)	Mean Fundamental Frequency (In Hertz)
Male	80-165 Hz	107-132 Hz
Female	145-275 Hz	196-224 Hz
Gender Ambiguous Range	145-165 Hz	

In a recent study involving listener judgments, Gelfer and Schofield (2000) obtained somewhat different results than those shown in Table 1. They found that some speakers with a speaking fundamental frequency (SFF) greater than 170 Hz were still perceived as male speakers. The mean SFF for Gelfer and Schofield's group of female-perceived speakers was 187 Hz, with speakers' SFFs ranging from 164 Hz to 199 Hz. Interestingly, there was some unexpected overlap between some of the male-rated speakers and the female-rated speakers in the range of 164 Hz to 181 Hz. Once again, speakers with a higher SFF were more likely to be perceived as female.

Oates and Dacakis (1997) noted that when frequency range and standard deviation were measured in Hertz, females were found to use a wider pitch range and pitch variability than males. Also, women's voices were judged as more "expressive" and "melodious" than men's voices. Oates and Dacakis (1997) reported that other studies reached similar conclusions. According to Pellowe and Jones (1978), women use greater intonational variability as well as more patterns of rising tones, whereas men use a higher proportion of falling tones.

2. Resonance

The American Heritage Dictionary (2000) defines resonance, in its acoustic sense, as the intensification and prolongation of sound, especially of a musical tone, produced by sympathetic vibration. Spencer (1988) and Gelfer & Schofield (2000) noted that resonance is among the most important parameters in gender identification. According to Oates and Dacakis (1997), resonance differences between male and female voices have been demonstrated consistently. Average formant frequencies of women's voices are

approximately 20% higher than those of males (p.179). This quality is usually attributed to the comparatively shorter vocal tracts of women (Hirano, Kurita, & Nakahima, 1983).

According to Andrews (1999), many genetic women have low-pitched, although feminine-sounding voices. This is a result of resonance and of women's small resonating cavities. Morrison and Rammage (1994) note that the length and shape of the vocal tract influence formant frequencies. Therefore, some men, trying to sound like women, may consciously try to shorten vocal tract length by raising the larynx.

Markus (2003) suggests that using a head voice/vocal register is required for a natural-sounding feminine voice. Table 2 presents the four vocal registers and their relationship to muscles used, parts of vocal folds in vibration, pitch quality, and pitch.

Table 2. **Vocal Registers – Muscles Used, Parts of Folds in Vibration, Quality Produced, and Pitch Level** (Web site of National Center for Voice and Speech:

<http://www.ncvs.org>)

Register	Muscles Used	Parts of Folds in Vibration	Quality Produced	Pitch Level
Pulse	Thyroarytenoid (TA) muscle only	Most	Vocal fry; pulsating	Lowest; below singing pitch
Chest	Mostly TA, some cricothyroid muscle (CT)	Most, both cover and body	Heavier, fuller tone	Lower part of singing range
Head	Mostly CT, some TA	Cover only	Lighter, thinner tone	Upper part of singing range
Falsetto	CT only, TA is completely lax	Very little, only outer cover layers	Lightest possible	Highest sung pitches; above normal range

Use of falsetto voice/register should be discouraged (Andrews, 1999). Use of the falsetto voice/register may be perceived as being a weak, effeminate, and fake feminine voice.

Appendix C shows some of the main anatomical terminology used for voice production.

3. *Loudness, Durational Characteristics, and Phrasing*

Gelfer and Young (1997) suggest that men use a higher conversational intensity level than women. According to Andrews (1999), most men attempting to use feminine speech markers must learn to use softer vocal onsets while speaking, a less forceful style, a linking of words that suggests a legato rather than a staccato pattern, and increased duration of some vowels (e.g., “so gorgeous”).

4. *Breathiness*

According to Klatt, & Klatt (1990) and Sulter, & Peters (1996) female voices are perceived as breathy more often than male voices. Research suggests that some women speak with incomplete closure of the vocal folds, which produces breathiness and which is viewed as normal for women, but far less likely to occur in men (Biever, & Bless, 1989; Sodersten, Hertegard, & Hammarberg, 1995).

5. *Articulation*

According to Andrews (1999) “women seem to open their mouths more than men and to articulate more clearly. However, they do not make hard articulatory contacts or punch out their words” (p.442).

6. *Language Structures and Vocabulary*

There are many differences in the way men and women use language to meet their needs and to interact socially with peers. Tannen (1992) states that men communicate as a means of establishing a place in the hierarchy and in order to acquire information, whereas women try to build consensus and share thoughts and feelings. According to Andrews (1999), women in our culture use the following when speaking: more tag questions (It's warm today, *isn't it?*), tentative language (I *think I may* go with you), inclusive pronouns (*Our* opinions may make a difference or *We* need to talk about this), increased elaboration, qualifiers, and disclaimers as well as increased use of adverbs, adjectives (It was a *wonderful* recital or She is so *beautiful* and so *stylish!*), and socially polite words/apologies and questions.

In her dissertation "The Socio-Linguistic Construction of Gender and Gender Relationships in a University Community," Remlinger suggests that men are less likely to ask questions in a public situation because doing so will reveal their lack of knowledge. Of course, this data does not suggest that all men will not ask questions when they are in doubt, nor that all women will; the differences are a matter of likelihood and degree. Research by Wolfson (1984) and Holmes (1989) suggests that women offer more compliments than men do and that women offer them more often to other women than to men. According to Tannen (2001), "compliments are a conventionalized form of praise, and exchanging compliments is a form of ritual, especially for many women" (p. 68).

Many authors (Zimmernam & West, 1975; Eakins & Eakins, 1976; McMillan, Clifton, McGrath, & Gale, 1977; Esposito, 1979; Bohn & Stutman, 1983) report that

males generally interrupt females more than females interrupt males during conversation. Zimmerman and West (1975) define an interruption as a violation of the turn exchange system and thus, as a device for exercising power and control in conversation. Esposito (1979) assigned 40 preschool children to play groups and found that boys interrupted girls twice as often as girls interrupted boys. While examining the speech of 16 mothers and 16 fathers, Gleason and Greif, (1983) found that fathers interrupt their children more than mothers, and that both interrupt female children more than male children. Vocabulary differences should also be addressed. Andrews (1999) suggests that there seem to be some terms (e.g., underwear vs. lingerie) that differ significantly, depending on whether men or women are speaking.

7. Nonverbal Communication

Nonverbal communication includes every component of communication other than words. It generally includes the following parameters: listening/attending behaviors such as eye contact and head nodding, hand gestures, smiling, crying, body posture and body positioning, touching, and so on.

Hirsh (2003) reports her ideas of gender differences in nonverbal communication. Such differences include the following speculations:

- Women tend to express their emotions more openly (e.g., laughing, crying).
- Women tend to exhibit more listening/attending behaviors during conversation (e.g., eye contact and head nodding).
- Women tend to use more gestures and movements to emphasize their statements.

- Women tend to touch themselves (e.g., playing with a necklace, tugging at earrings, playing with their hair).
- Women also tend to touch their conversational partners to express support, affection, agreement, and comfort.
- Women tend to move their heads while speaking and while listening to their conversational partner.
- Women tend to sit more closely to their conversational partners.
- Women tend to use a wide range of facial expressions to convey their emotions.
- Women tend to stand in an “S-Shape” figure (the body is shaped as an “S” letter) while men tend to stand in an “A-Shape” figure (the body is shaped as an “A” letter).

Results of a research study conducted by Astrom, Thorell, and d’ Elia (1993) showed that females consider face communication (e.g., eye contact and smile) to be the most important aspect of nonverbal communication. According to Epps (1989), females are more “accommodating” than males in their decoding of unintended, unconscious, or deceptive cues.

II. Speech and Singing - A Comparison

Acoustically, singing and speech are fundamentally similar. Both use sound and are, therefore, received and analyzed by the same organs. Both music and speech are forms of expression, and music is often referred to as a nonverbal means of communication (Hoskins, 1988). Although many of their acoustical features are similar,

they are used in different ways. Music/singing is closely related in human beings to speech and language, both neurologically and developmentally (Michel & Jones, 1991).

Infants in the womb react both to unstructured noise and to music with movements that their mothers can feel (Storr, 1992). It seems that the origins of both music and language lie in the connection between the neural development of the fetus and this early sound environment (Callaghan, 2000). After birth, the affective expressions of crooning, cooing, and babbling develop into speech and song (Storr, 1992), with the distinction between speech and song often unclear (Welch, 1994). Brody (1949) suggests that infants tend to experiment with vocalizations and sounds that are mostly of a singing nature. As speech develops, the vocal experimentation may dwindle due to the need to focus on learning meaningful speech sounds (Kessen, Levine & Wendrich, 1979; Wendrich, 1981; Fox, 1983, Sinor, 1984; Trollinger, 1994).

Some writers theorize that music and speech develop in a parallel fashion from adjacent areas of the brain, and differentiate into what are called speech language and music language (Boyle & Radocy, 1979). According to Gfeller (1990), obvious parallels and differences exist between speech and music in terms of syntax, semantics, and social context. As part of the same developmental sequence, the two are complimentary and may reciprocate in many ways. Singing, however, is different from speech in that it is a more varied form of communication having a wider variety of pitches, rhythms, and form patterns.

According to Trollinger (2001), perceived variation in pitch is a characteristic of connected speech as well as singing, although the pitch of one's speaking voice is not as

consciously controlled as the pitch variables in the singing voice. The relationship between singing and speech production has historically been viewed as a way for orators to learn vocal expressiveness (Quintilian in Mark, 1994). According to Sundberg (1987), “Many actors study singing to improve vocal expressiveness, as insight to a character’s emotional state can be heard in the pitch contour, duration of the various syllables, and other aspects of speech” (p.148).

Andrews (1999) suggests that voice production is a multisystem activity that involves integration and coordination of the movements of different structures. According to Trollinger (2001), the functions of this system for speech and song have been investigated separately by a number of researchers. However, very little research exists regarding the relationship of the sounds of speech as they relate to the sounds for singing. In *Literacy Style and Music*, Spencer (1950) wrote that there is a relationship between speech and music expressed through singing. Spencer also suggests that there is a relationship between the native language and the ability to sing, although he acknowledges that there is not “much direct evidence in support of his conclusion.”

Spencer states:

May we not say, for instance, that the Italians, among whom modern music was earliest cultivated, and who have more especially excelled in melody - may we not say that these Italians speak in more varied and expressive inflections and cadences than any other people? On the other hand, may we not say that, confined almost exclusively as they have hitherto been to their national airs, and therefore accustomed to but a limited range of musical expression, the Scotch are unusually monotonous in the intervals and modulations of their speech? (Spencer, pp. 72-73).

The ability to sing has been described in many ways, ranging from it being a cultural necessity to it being a discrete talent that only a few possess (Trollinger, 2001). Anecdotal evidence suggests that some adults sing easily and beautifully while others find that just trying to match pitch or sing a simple tune is difficult. A number of researchers (Hattwick, 1933; Drexler, 1938; Jersild & Bienstock, 1931, 1934; Harkey, 1979; Sinor, 1984; Ries, 1987; Brown, 1988; Flowers & Dunne-Sousa, 1990) have found that the ability to discriminate between the skills needed for singing and speech may arrive at a critical stage of development during or after language onset. Trollinger (2001) hypothesizes that humans may be born with the ability to sing; however, unless this skill is exercised both cognitively and physically, it may cease to exist.

III. Melodic Intonation Therapy (MIT)

Melodic Intonation Therapy (MIT) is a therapy technique that was developed by Sparks and Holland (1974) and further developed by Helm-Estabrooks and Naeser (1985). Melodic Intonation Therapy is described by Sparks and Holland (1976) as a method to aid adults with severe aphasia in recovery of the ability to encode thoughts into units of meaningful verbal communication. According to Square and Martin (1994) MIT is an approach that helps adults with aphasia re-establish an underlying melody and rate for speech production as well as produce simplistic and fully syntactic utterances. Even though the original intention for developing MIT was to assist aphasic patients in regaining some of their ability to use language, some clinicians are using the technique as a phonological intervention for clients with verbal apraxia and foreign accent reduction. The use of MIT with these clients may be justified since research shows that an

unimpaired right cerebral hemisphere is dominant for music and that it controls prosody of speech (Sparks et al., 1974).

The therapeutic benefits of MIT for aphasic patients with good comprehension but minimal speech output were first reported by Albert, Sparks and Helm (1973) in a preliminary report. In the three cases reported, MIT treatment resulted in increased spontaneous verbal output in the natural environment. One patient required only two weeks of treatment to progress from the use of six repetitive phonemes to full responses that were grammatically correct in his natural environment. The other two patients required approximately 1 to 1.5 months of treatment in order to progress from meaningless grunts and stereotyped phonemes to participation in short but meaningful conversations. In a second report (Sparks, Helm, & Albert, 1974), a physiological model was presented that would account for MIT success in terms of right cerebral hemisphere dominance for music and speech prosody. Several other reports, however, found that MIT was not effective as measured by improved language test scores for some nonfluent aphasic patients (Sparks et al., 1974; Helm, 1979). In an attempt to provide clearer guidelines for use of MIT, Naeser and Helm-Estabrooks (1985) undertook a study that examined site of lesion correlated with improved 'language' test scores as derived from the *Boston Diagnostic Aphasia Examination (BDAE)* (Goodglass and Kaplan, 1972) following MIT treatment of eight patients who had also received Computed Tomography (CT) scans. MIT proved to be a successful treatment method for the patients who had no damage in the Wernicke's area of the brain.

1. *The Form of MIT*

MIT involves combining short phrases with rhythmic and melodic patterns that imitate normal speech inflections. According to Luria, (1970); Rosenbek and LaPointe, (1978; 1985;) and Rosenbeck et al. (1976), MIT consists primarily of hand gestures coupled with word production of ‘intoned’ rather than spoken speech. Meaningful phrases such as ‘I want coffee’ and ‘Go to bed’ are often produced clearly after a patient has successfully completed the various steps of the MIT approach. Treatment occurs in three stages: unison speech with melodic patterns, imitative speech with melodic patterns, and imitative speech without melody.

2. *A Comparison of MIT with Singing and Speech*

Melodic Intonation Therapy involves singing. It is similar to singing in that it incorporates melody, rhythm, and stress. Sparks and Holland (1976) briefly describe the difference between MIT and songs. Specifically, songs have distinct melodies. In contrast, MIT is based on the spoken prosody of verbal utterances. MIT uses a vocal range that is limited to three or four whole steps. This limited range of sung pitches is comfortable for the untrained voice of adults. MIT is based on three elements of spoken prosody: The melodic line or variation of pitch in the spoken phrase or sentence, the tempo and rhythm of the utterance, and points of stress in the phrase. Some exaggeration of the three elements of a spoken prosody model occurs when the utterance is intoned. First, the tempo is lengthened to a more lyrical utterance. Second, the constantly varying pitch of speech is reduced and stylized into a melodic pattern involving the constant pitch of several whole steps. Third, the rhythm and degree of stress for purposes of emphasis

is exaggerated, something that usually involves increased loudness and elevation of sung notes. These three modifications of spoken prosody serve as a means of emphasizing the prosodic structure of the utterance.

According to Miller (1994), MIT relates to speech and is much like chanting; however, it uses a slower and more lyrical tempo than speech with more precise rhythm and more accentuated points of stress. Intonation patterns that resemble those of well-known songs should be avoided, since regression to the words of the songs may occur if such melodies are used. Since there are several alternate prosody patterns for any utterance, the clinician must exercise her/his own judgment as to which one will be used for a phrase/sentence.

3. *The Hierarchy of MIT*

MIT involves four main levels. Level I, which has no linguistic component, establishes the process of intoning melody patterns and accurately hand-tapping the rhythm and stress of each pattern. During Level II, the client is asked to respond to a request from the clinician for a repetition of the target sentence. In Level III, difficulty is increased by fading participation of the clinician, by introducing enforced delay of responses so that some element of retrieval is introduced, and by requiring the client to give appropriate intoned responses to intoned questions from the clinician regarding elements of information in the sentences. Finally, during Level IV, there is return to normal speech prosody. Transition back to speech prosody is facilitated by a technique called *sprechgesang* (speech-song).

CHAPTER III

METHODS

I. Participants

Male-to-female transgender persons experience feminizing effects from taking estrogen, such as breast enlargement and some softening of muscle definition; however, there are no feminizing effects on the vocal folds and thus, pitch level remains at adult male levels. It would appear that some forms of vocal fold surgery, such as longitudinal incision of vocal folds or some form of thyroplasty could enable a higher-pitched voice (Blaugrund, Isshiki, and Taira, 1992). Unfortunately, even after surgical intervention, the male-to-female transgender person may still experience vocal dissatisfaction and thus, profit from voice therapy. This is not to say that all transgender individuals undergo surgery or take estrogen. There are many who simply desire to sound more feminine in order to match their voice with their feminine appearance. These individuals are also in need of the services of speech-language pathologists.

Participants for this study were recruited from a transgender support group in Greensboro, North Carolina, and by word of mouth. Six male-to female individuals, ranging in age from 37 to 63 years, volunteered to participate in the study. Participants were US citizens and used English as their first language. Participant data is located in Table 3.

Table 3 – Individual Information

Participant:	Age:	Hormone Therapy:	Surgery Status (SRS):	Previous Voice Therapy:	Transition Status:	Musical Experience
#1	63	Yes	Pre-op	Yes	90% Female 10% Male	Yes
#2	53	No	Pre-op	No	100% Female 0% Male	No
#3	37	Yes	Pre-op	No	10% Female 90% Male	Yes
#4	52	No	Pre-op	Yes	70% Female 30% Male	No
#5	62	Yes	Post-op	No	100% Female 0% Male	Yes
#6	52	No	Pre-op	No	10% Female 90% Male	No

Participants were randomly divided into two groups: Three individuals (participants #1, #2, and #3) received traditional voice therapy plus feminine language structures/vocabulary and nonverbal communication (Group 1), while the remaining three individuals (participants #4, #5, and #6) received traditional voice therapy plus singing exercises and Melodic Intonation Therapy (MIT) – (Group 2). Participants were randomly chosen for these groups. All participants received traditional voice therapy techniques in a group setting. These techniques included: use of appropriate body posture, diaphragmatic breathing, voice journal, pitch and pitch variability exercises, vowel prolongation exercises, legato phrasing exercises, breathiness exercises, and

resonance exercises. Sessions lasted for 60 minutes. Groups 1 and 2 both received 45 minutes of traditional voice therapy interventions. In Group 1, participants received feminine language structures/vocabulary and nonverbal communication for the remaining 15 minutes in order to establish equal amounts of time of receiving traditional voice therapy as in Group 2. In Group 2, participants received singing exercises and MIT for the remaining 15 minutes. Figures 1 illustrates the division of time during therapy for Group 1 and Group 2. Table 4 shows the therapy approaches used with each group.

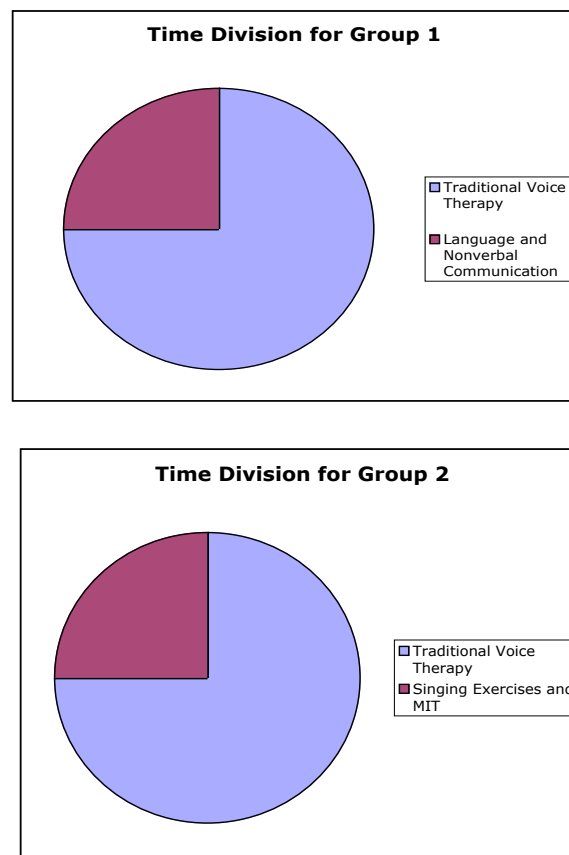


Figure 1: Division of Time during Therapy for Group 1 and Group 2

Table 4 shows the therapy approaches received by Group 1 and Group 2.

Table 4 – Therapy Approaches Received by Group 1 and Group 2

Note: An asterisk indicates that participants in the particular Group (1 or 2) received the corresponding therapy approach.

Therapy Approaches	Group 1	Group 2
Warm-Up Exercises		*
Singing Exercises		*
Melodic Intonation Therapy		*
Vocal Hygiene Recommendations	*	*
Posture	*	*
Diaphragmatic Breathing	*	*
Voice Journal	*	*
Pitch and Pitch Variability	*	*
Vowel Prolongation	*	*
Legato Phrasing	*	*
Breathiness	*	*
Resonance	*	*
Language Structures and Vocabulary	*	
Nonverbal Communication	*	

II. Equipment and Materials

Data was recorded by audio-recordings, videotapes, and written records. All group sessions were audio- and videotaped. Data gathering tools also included the CSL (Kay Elemetrics) (Computerized Speech Lab), a self-calibrating PC-based speech and signal processing system that contains a broad range of voice analysis tools and is used for speech analysis in research and clinical settings. Fundamental frequency during reading and conversation was obtained by use of the CSL.

III. Procedures

1. Pretest

A pretest was given to all participants to identify the baseline for the study. All testing was conducted in the Applied Communication Sciences Lab in Ferguson Building at the University of North Carolina at Greensboro and took approximately 45-60 minutes. The pretest included the following components for each participant:

- *Permission* – Prior to any testing, all participants were informed of their rights by way of a brief oral presentation by the principal investigator and a participant consent form was signed before testing began. All participants were assigned individual numbers to protect their privacy so that they would not be identified by name in this study.
- *Interview* – During a brief interview, the principal investigator asked each participant a series of questions related to their transition process, social experiences and support, vocal characteristics, and goals for voice therapy. Most

of the questions used for the interview were taken from Andrews (1999)

(*Appendix D*).

- *Voice Evaluation* – The voice evaluation (*Appendix E*) included the following measures for each participant:
 - Fundamental frequency during reading – Refers to the frequency (measured in Hertz) that an individual habitually uses during reading. The participants were asked to read a standard text passage (e.g., The “Rainbow Passage”),
 - Fundamental frequency during conversation – Refers to the frequency (measured in Hertz) that an individual habitually uses during conversation. The participants were asked to converse for 1-2 minutes with the principal investigator, and fundamental frequency was measured by the principal investigator.

IV. Therapy Approach

Following the pretest, participants were randomly divided into two groups. Both groups received twelve weeks of voice therapy for 60 minutes, once a week, with the principal investigator, to improve vocal behaviors or communication patterns identified and perceived during the pretest as more masculine than feminine. Group 1 received traditional voice therapy only while Group 2 received traditional voice therapy in combination with singing exercises and Melodic Intonation Therapy (MIT). *Appendix F* shows the suggested organization of weekly sessions for twelve consecutive weeks. The 12-week duration and general organization of the sessions was adapted from Mordaunt

(2003). All therapy techniques were the same for both Groups; however, Group 1 received 15 minutes of instruction in feminine language structures and nonverbal communication techniques while Group 2 received additional Melodic Intonation Therapy (MIT) and singing exercises for 15 minutes. Each session was designed in order to meet the following goals:

- Good vocal hygiene
- Good body posture
- Appropriate use of diaphragmatic breathing
- Appropriate pitch level and pitch variability
- Appropriate resonance
- Appropriate vowel prolongations
- Appropriate phrasing/legato speech
- Appropriate vocal onsets, breathiness, and loudness levels

During the second week of the therapy sessions, anatomy and physiology of the vocal mechanism were briefly introduced by the principal investigator, with the aid of pictures and diagrams from Blue Tree Publishing, Inc.

1. *Singing Exercises*

Singing exercises (*Appendix G*) were included in each session for participants in Group 2. These exercises help establish focus, proper breathing habits, and physical readiness for singing (Robinson & Althouse, 1997).

In her study “The Effect of Singing Instruction upon the Speech Production of Neurologically Impaired Persons,” Cohen (1991) found that the treatment group showed

significant improvements in speaking fundamental frequency variability. According to Oliveira Barrichelo, Heuer, Dean, & Sataloff (2001), singing training has a positive effect on the resonance of the speaking voice. Their research suggests that singers show more energy concentration in the singer's formant/speaker's ring region in both sung and spoken vowels. Results from another study support the view that fundamental frequency is monitored better in singing than in the speaking voice where it is mainly controlled supra-segmentally (Natke, Donath, & Kalveram, 2003).

2. Melodic Intonation Therapy (MIT) Exercises

Melodic Intonation Exercises (*Appendix H*) were also included in each session for participants in Group 2. Following the guidelines suggested mainly by Sparks, & Holland (1976), these exercises were designed by the principal investigator to assist the participants in developing better pitch variability while speaking. These exercises/utterances were first sung by the principal investigator, then by the participants, and finally they were spoken with exaggerated pitch variability by the participants.

3. Voice Journal

All participants were required to keep a weekly voice journal, which was provided by the investigator at the beginning of therapy (*Appendix I*). In the journal, participants kept written records of all information relevant to their voice progress, therapy experiences, observations, and comments.

V. Therapy Techniques

The following therapy techniques and exercises were used with all participants.

1. Vocal Hygiene Recommendations

Each participant was guided by the principal investigator through some general vocal hygiene recommendations (Swartz, 2004). These include the following:

- Increase hydration and humidification,
- Reduce/eliminate caffeine, smoking, and alcohol consumption,
- Identify medications that may have side effects including hoarseness and/or cough,
- Assess environment for airborne irritants and wear a mask if necessary,
- Reduce exposure to allergens,
- Assess acoustic properties of a room and modify as needed,
- Use amplification during periods of extended voice use,
- Avoid excessive talking, screaming, and yelling, and
- Avoid talking while stressed, tired, or when you have a cold/upper respiratory infection.

2. Posture

Each participant was guided by the principal investigator in establishing good body posture. Good vocal production is dependent upon proper posture. The vocal mechanism works optimally when the head, neck, and back are well aligned, as if an imaginary line were passing through the center of the body from the crown of the head to the floor. Good body posture was accomplished by emphasizing the following points:

- The crown of the head should be the highest point,
- The head should be loose and centered on the shoulders,

- The chin should be at a 90 degree angle with the neck,
- The chest cavity and the back should be expanded,
- The arms should hang loose and the hands should fall in front of the thighs,
- The pelvis should be tilted and the lower back should be relaxed,
- The knees should be unlocked,
- The body weight should be evenly distributed on the heels and soles,
- The feet should be apart for balance.

3. *Diaphragmatic Breathing*

Each participant was given a description of the diaphragmatic breathing process, followed by a series of breathing exercises (*Appendix J*).

4. *Pitch and Pitch Variability Exercises*

Each participant was guided by the principal investigator in establishing appropriate pitch level and pitch variability by using the Real Time Pitch program on the CSL (Kay Elemetrics) as well as Gelfer's Steps in Voice Therapy for Transgender Clients (*Appendix K*).

5. *Vowel Prolongation Exercises*

Each participant was instructed through vowel prolongation exercises. According to Andrews, 1999, some women tend to use an increased duration of some vowels (e.g., "Soo gorgeous"). *Appendix L* demonstrates some of the utterances used for this exercise. The underlined vowels represent the vowels that should be prolonged.

6. *Legato Phrasing Exercises*

Each participant was instructed through legato phrasing exercises. According to Andrews (1999), some women tend to use a linking of words that suggests a legato rather than a staccato pattern. *Appendix M* shows some of the words and sentences used for these exercises (Andrews, 1999).

7. *Breathiness Exercises*

Each participant was instructed through exercises to increase breathiness. Research shows that some women speak with an incomplete closure of the vocal folds, something which is viewed as normal for women, but far less likely to occur in men (Biever and Bless, 1989; Sodersten, Hertegard, and Hammarberg, 1995). According to Klatt, and Klatt (1990) and Sulter and Peters (1996) female voices are perceived as breathy more often than male voices. *Appendix I, N* includes some of the words and sentences used for this exercise.

8. *Resonance Exercises*

Each participant was guided by the principal investigator in establishing appropriate “frontal focus” sensations. Frontal focus refers to the resonation of the voice in the supraglottic cavities. *Appendix O* includes some of the exercises used with each participant to improve frontal focus.

9. *Language Structures and Vocabulary Exercises*

Participants in Group 1 were instructed by the principal investigator during group conversations to use feminine language structures and vocabulary (see *Appendix P*) such as: increased use of questions and especially tag questions, tentative language, inclusive

pronouns, qualifiers, and disclaimers, as well as increased use of adverbs, adjectives, socially polite words/apologies, and elaboration. Each participant was also instructed to use vocabulary that is more often used by women than by men. Such vocabulary may include the following words: wonderful, sweet, lovely, and elegant. Most of the examples from *Appendix P* were taken from Tannen (1992).

10. *Nonverbal Communication Exercises*

Participants in Group 1 were instructed through nonverbal communication exercises as part of the holistic voice therapy approach adopted by the principal investigator. These exercises (see *Appendix Q*) included focusing on body and head movements, hand gestures, eye contact and facial expressions. Most of the examples from *Appendix Q* were taken from Hirsh (2003).

VI. Posttest

A posttest was given twelve weeks after the first session of voice therapy. The purpose of the posttest was to determine generalization and carryover of the new vocal characteristics and communication patterns learned during the therapy sessions. All testing was conducted in the Applied Communication Sciences Lab in Ferguson Building at the University of North Carolina at Greensboro and lasted for approximately 45-60 minutes. The posttest included the following components for each participant:

1. *Interview* – During a brief interview, the principal investigator asked each participant a series of questions related to their voice therapy experiences (*Appendix R*).

1. *Voice Evaluation* – A voice evaluation (as stated above in the pretest section) was completed for all participants during the last voice therapy session.

VII. Reliability

All data was recorded by the principal investigator at the time of testing. Audio recordings were made of a reading passage (“The Rainbow Passage”) for each participant for perceptual analysis by the study’s judges. Data was judged by two first-year speech-language pathology graduate students and by two non-trained volunteers. The judges were asked to rate voice quality on a 1-7 rating scale, 1 being a very masculine sounding voice and 7 being a very feminine sounding voice. Audio recordings of the participants’ voices pre- and post- therapy were randomly played along with a few recordings of biological males and females. The perceptual judgments were compared with the judgments of the principal investigator and only those in which there was a 75% (3 out of 4 judges) or above agreement and the results were within 1 point difference were used for data analysis.

VIII. Data Analysis

Results for each participant for the Voice Evaluation, and the qualitative/perceptual judgments made about participants’ voice quality (1-7 rating scale) from the four judges as well as the participants themselves were analyzed as single case studies. Differences in qualitative/perceptual judgments made by the four judges and participants themselves will be discussed in each case study. Differences in quantitative measures from the voice evaluation (fundamental frequency during reading and

conversation, and pitch range) before and after treatment will also be discussed by the principal investigator for each case study. Selected information and comments from each participant's voice journal as well as posttest interviews will also be included. All results for each participant will be displayed in a table.

CHAPTER IV

RESULTS

Due to the small sample size (n=6) of this study, data analysis consisted primarily of descriptive analysis. Data regarding Maximum Phonation Range (MPR) was not obtained during this study due to a computer malfunction and, therefore, will not be included. In this section, quantitative results are presented in addition to case studies for each individual participant.

Quantitative Results – Speaking Fundamental Frequencies (SFFs)

At the beginning of the study, five (83%) out of the six participants presented with speaking fundamental frequencies (SFFs) below the 160-165 Hz frequency range, which has been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). Participant #2 (Group 1) presented with SFFs within this range (Tables 5 and 6). At the end of the study, all (100%) of the participants presented with SFFs above the 160-165 Hz frequency range. Tables 5, 6, and 7 illustrate the quantitative results taken at the beginning and end of therapy for SFFs during reading and conversation.

Table 5 – Speaking Fundamental Frequency (SFF) during Reading

Participants	Fundamental Frequency During Reading - Pretest	Fundamental Frequency During Reading - Posttest	Difference
#1 (Group 1)	156.31 Hz	209.99 Hz	+ 53.65 Hz
#2 (Group 1)	165.72 Hz	189.50 Hz	+ 23.78 Hz
#3 (Group 1)	86.13 Hz	204.86 Hz	+ 118.73 Hz
#4 (Group 2)	148.59 Hz	229.69 Hz	+ 81.10 Hz
#5 (Group 2)	153.02 Hz	225.01 Hz	+ 71.99 Hz
#6 (Group 2)	98.80 Hz	205.77 Hz	+ 106.97 Hz

Table 6 – Speaking Fundamental Frequency (SFF) during Conversation

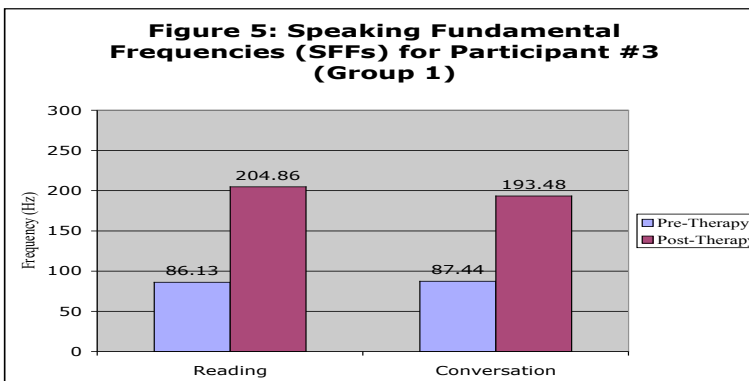
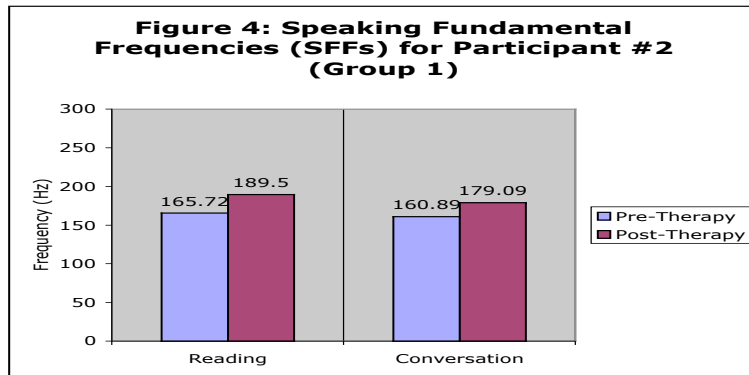
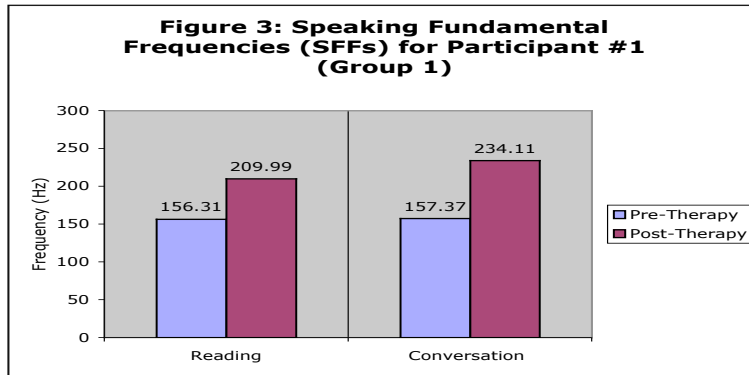
Participants	Fundamental Frequency During Conversation - Pretest	Fundamental Frequency During Conversation - Posttest	Difference
#1 (Group 1)	157.37 Hz	234.11 Hz	+ 76.74 Hz
#2 (Group 1)	160.89 Hz	179.09 Hz	+ 18. 20 Hz
#3 (Group 1)	87.44 Hz	193.48 Hz	+ 106.44 Hz
#4 (Group 2)	149.31 Hz	237.47 Hz	+ 88.16 Hz
#5 (Group 2)	156.11 Hz	240.11 Hz	+ 84.00 Hz
#6 (Group 2)	103.00 Hz	193.46 Hz	+ 90. 46 Hz

Table 7 - Speaking Fundamental Frequency (SFF) during Reading and Conversation for Group 1 and Group 2

Group 1	Reading	Conversation
Pretest	136.05 Hz	135.23 Hz
Posttest	201.45 Hz	202.23 Hz
Difference	+ 65.40 Hz	+ 67.00 Hz
Group 2		
Pretest	133.47 Hz	136.14 Hz
Posttest	220.16 Hz	223.68 Hz
Difference	+ 86.69 Hz	+ 87.54 Hz

Figures 3-8 show individual graphs for each participant's SFFs pre- and post-testing during reading, and conversation.

Results for Group 1 are shown below in Figures 3-5



Results for Group 2 are shown below in Figures 6-8

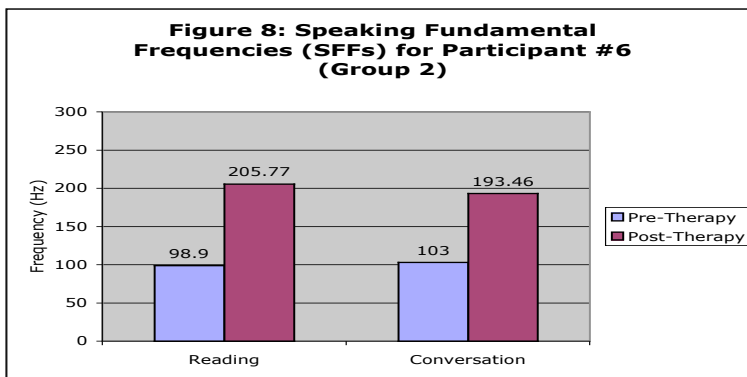
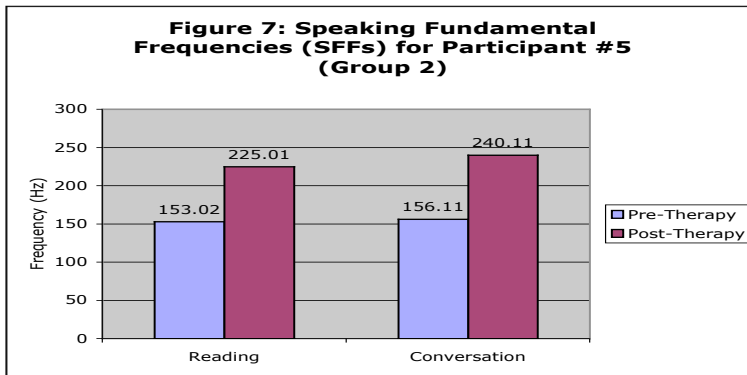
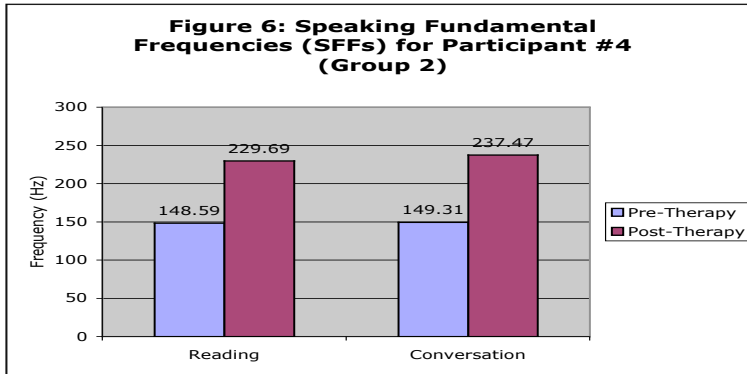
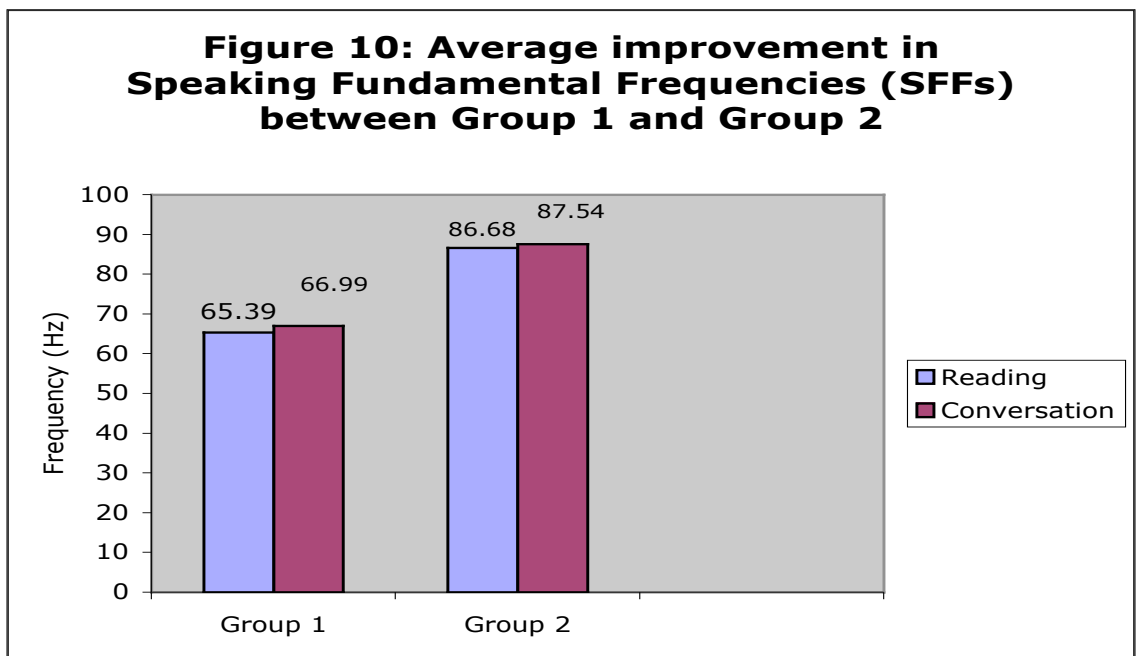
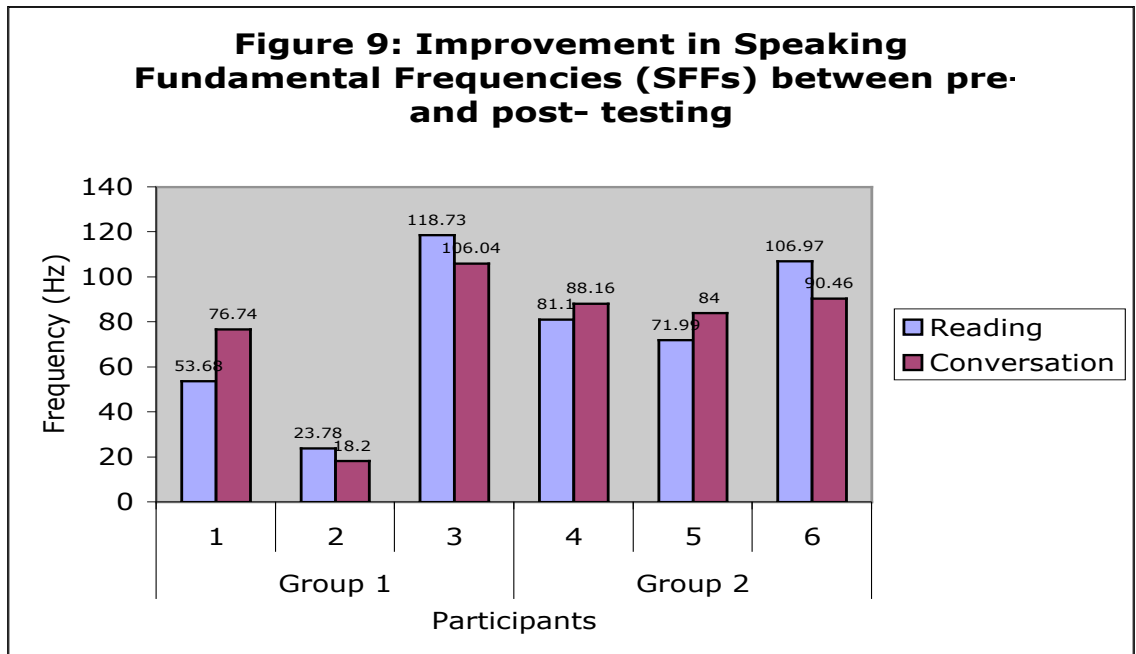


Figure 9 shows improvement in SFFs between pre-and post-testing for each participant and Figure 10 shows improvement in SFFs between the two groups.



1. *Voice Rating by Participants*

At the beginning and end of the study, the participants were asked to rate how masculine or feminine they perceived their voices to be on a scale of 1-7 (1 being a very masculine voice and 7 being a very feminine voice). Upon completion of the study, all participants presented with ratings that were higher than the ratings given by the participants at the beginning of the study. Results are shown in Figure 11. Participants 1-3 are Group 1 (traditional voice therapy) participants and participants 4-6 are Group 2 (singing and MIT) participants. Table 8 shows pretest and posttest ratings by the participants as well as the difference between those ratings.

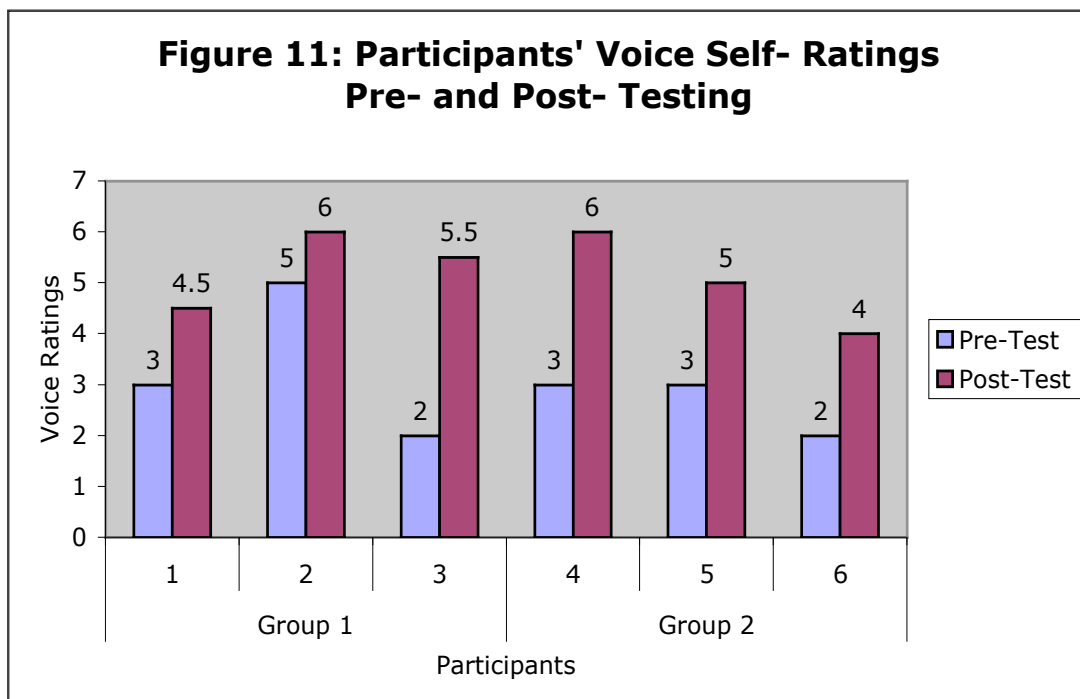


Table 8. **Participant Pretest and Posttest Self-Ratings and Difference of Ratings**

Participants	Pretest Ratings	Posttest Ratings	Difference
#1 (Group 1)	3	4.5	+ 1.5
#2 (Group 1)	5	6	+ 1
#3 (Group 1)	2	5.5	+ 3.5
#4 (Group 2)	3	6	+ 3
#5 (Group 2)	3	5	+ 2
#6 (Group 2)	2	4	+ 2

2. Voice Rating by Judges

At the end of the study, four judges (two first-year speech-language pathology graduate students and two non-trained volunteers) were asked to rate audio recordings of both reading and conversation for each participant's voice, pre- and post- voice therapy. Figures 12-15 show the voice ratings given by the four judges pre- and post- voice therapy. Judge #1 and #2 were first-year speech-language pathology graduate students and judge #3 and #4 were random volunteers.

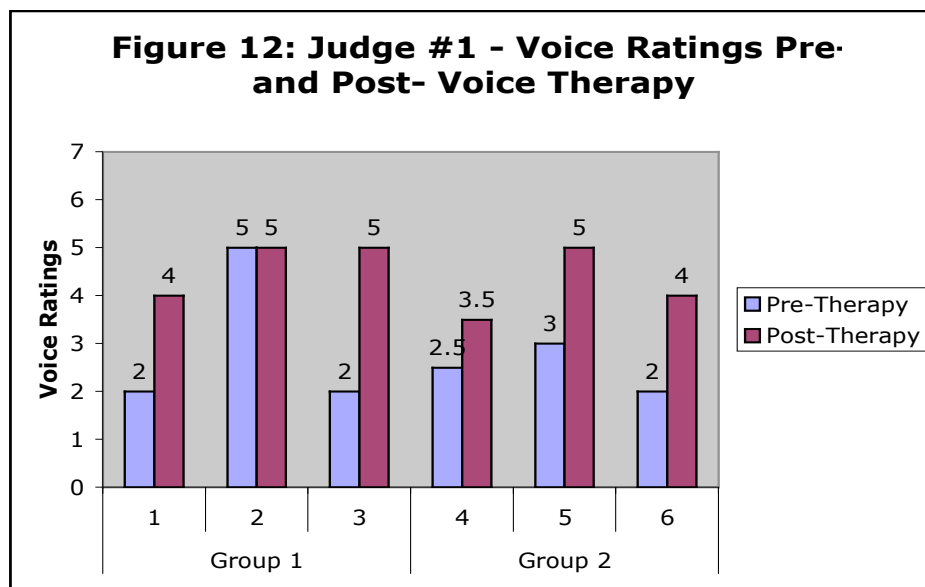


Figure 13: Judge #2 - Voice Ratings Pre - and Post - Voice Therapy

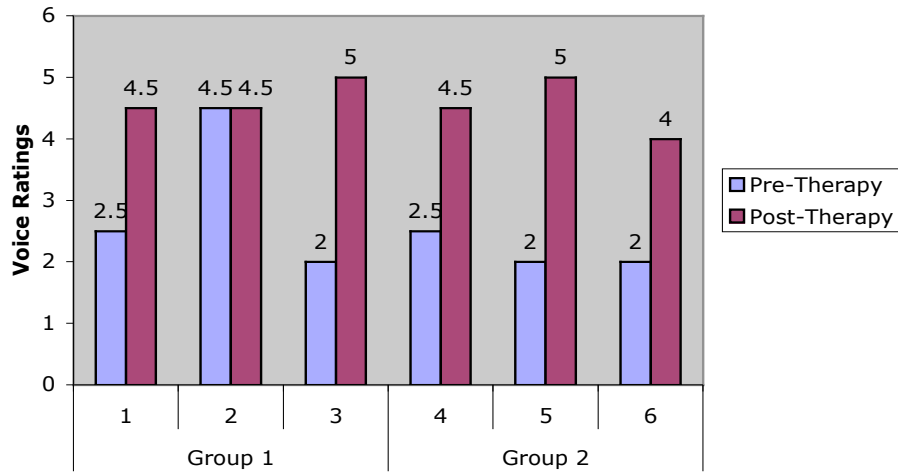
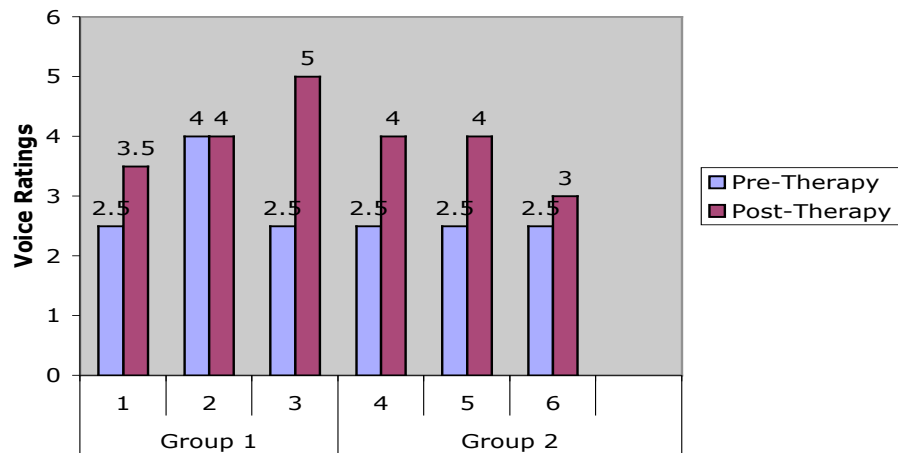
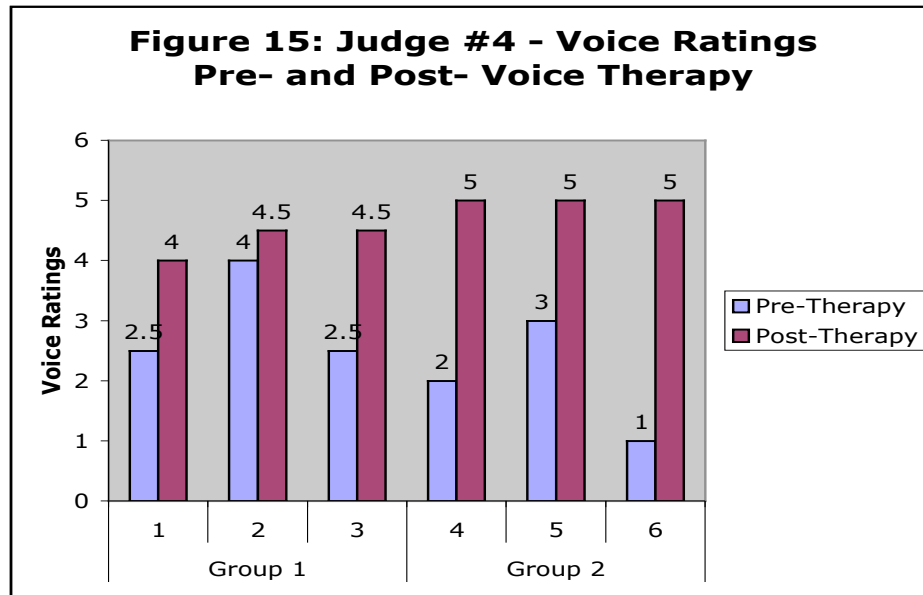


Figure 14: Judge #3 - Voice Ratings Pre- and Post- Voice Therapy





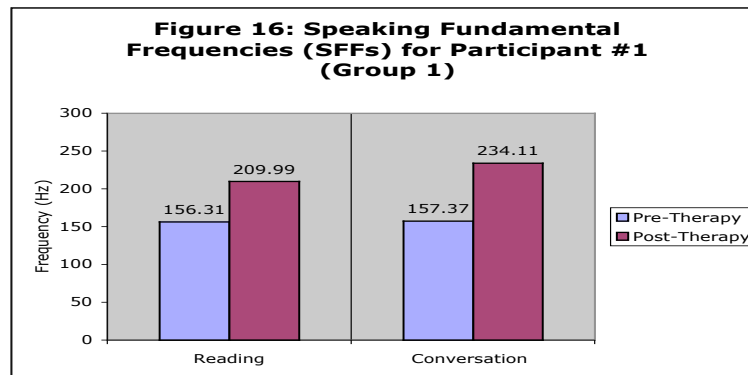
Case Studies

Case Study – Participant 1

Participant 1 (Group 1), age 63 years, had received previous voice therapy training at the Speech and Hearing Center of the University of North Carolina at Greensboro for two academic semesters. The participant was recruited for the study as a volunteer from a transgender support group in Greensboro, North Carolina. Participant 1 had not undergone sexual reassignment surgery (SRS); however, she reported that she has been receiving feminizing hormones. The participant had a musical background in singing. She enjoyed singing during services at her local church as well as singing along to recorded music. Participant 1 reported that on the male-to-female transition status, she presented as 90% female and 10% male.

Quantitative Results:

At the beginning of the study, participant 1 presented with speaking fundamental frequencies (SFFs) below the 160-165 Hz frequency range (156.31 Hz during reading and 157.37 Hz during conversation), which have been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). At the end of the study participant 1 presented with SFFs above the 160-165 Hz frequency range (209.99 Hz during reading and 234.11 Hz during conversation). Figure 16 shows the participant's SFF pre- and post- voice therapy.



Qualitative Results:

At the beginning and end of the study, the participants were asked to rate how masculine or feminine they perceived their voices to be on a scale of 1-7 (1 being a very masculine voice and 7 being a very feminine voice). At the beginning of the study, participant 1 rated her voice with a 3 and at the end with a 4.5. Ratings by the other judges were the following:

Femininity/ Masculinity Ratings	Judge #1	Judge #2	Judge #3	Judge #4	Judges' Average	Participant's Ratings
Pre- Therapy	2	2.5	2.5	2.5	2.38	3.0
Post- Therapy	4	4.5	3.5	4	4.0	4.5

Participant's Overall Comments and Suggestions:

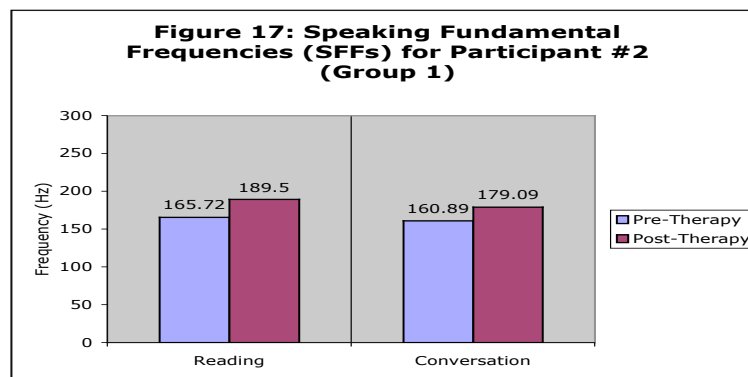
Participant 1 reported that she found the resonance exercises and the Real Time Pitch (Kay Elemetrics) exercises to be the most helpful in helping with acquiring a more feminine voice. She reported that she found the Real Time Pitch (Kay Elemetrics) exercises to be helpful since she could visualize her pitch being in the feminine range. Participant 1 also reported that she found the group aspect of therapy to be beneficial since it allowed for positive reinforcement and peer feedback. Some of the comments in the participant's voice journal include reporting difficulties with conversational speech vs. reading. She reported that that her "pitch drops" when she has to think of what to say instead of reading the words and simply thinking of her pitch and overall quality of her voice. Participant 1 had no suggestions for future voice sessions.

Case Study – Participant 2

Participant 2 (Group 1), age 53 years, had not received previous voice therapy training. The participant was recruited for the study as a volunteer from a transgender support group in Greensboro, North Carolina. Participant 2 had not undergone sexual reassignment surgery (SRS), and she had not been receiving feminizing hormones. The participant did not have a musical background. Participant 2 reported that on the male-to-female transition status, she presented as 100% female.

Quantitative Results:

At the beginning of the study, participant 2 presented with speaking fundamental frequencies (SFFs) in the 160-165 Hz frequency range (165.72 Hz during reading and 160.89 Hz during conversation), which has been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). At the end of the study participant 2 presented with SFFs above the 160-165 Hz frequency range (189.50 Hz during reading and 179.09 Hz during conversation). Figure 17 shows the participant's SFF pre- and post- voice therapy.



Qualitative Results:

At the beginning of the study, participant 2 rated her voice with a 5 and at the end with a 6. Ratings by the other judges were the following:

Participant Ratings	Judge #1	Judge #2	Judge #3	Judge #4	Judges' Average	Participant's Ratings
Pre-Therapy	5	4.5	4	4	4.38	5
Post-Therapy	5	4.5	4	4.5	4.5	6

Participant's Overall Comments and Suggestions:

Participant 2 reported that she found the resonance exercises and the feminine language exercises to be the most helpful in helping with acquiring a more feminine voice. Participant 2 also reported that she found the group aspect of therapy to be beneficial since it allowed for positive reinforcement and peer feedback. Some of the comments in the participant's voice journal include comments regarding difficulties with pitch and pitch inflection when the conversation requires a "passionate speaking style" as well as difficulties with maintaining forward resonance while speaking in long sentences. Participant 1 had no suggestions for future voice sessions.

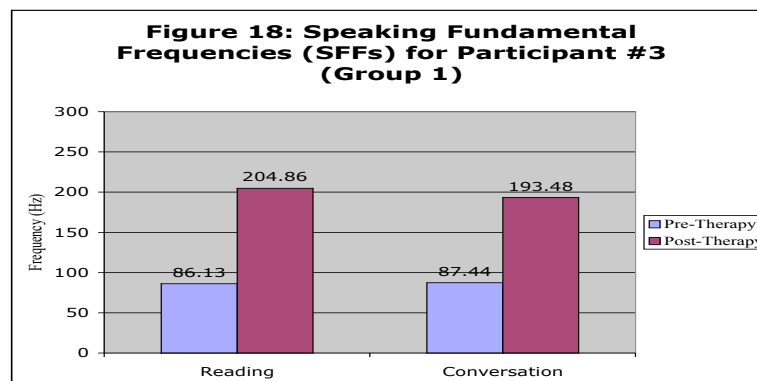
Case Study – Participant 3

Participant 3 (Group 1), age 37 years, had not received previous voice therapy training. The participant was recruited for the study as a volunteer from a transgender

support group in Greensboro, North Carolina. Participant #3 had not undergone sexual reassignment surgery (SRS); however, she reported that she had been receiving feminizing hormones. The participant had a musical background. She reported playing the harp on a professional basis. On the male-to-female transition status, participant 3 presented as 10% female and 90% male.

Quantitative Results:

At the beginning of the study, participant 3 presented with speaking fundamental frequencies (SFFs) below the 160-165 Hz frequency range (86.13 Hz during reading and 87.44 Hz during conversation), which has been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). At the end of the study participant 3 presented with SFFs above the 160-165 Hz frequency range (204.86 Hz during reading and 193.48 Hz during conversation). Figure 18 shows the participant's SFF pre- and post- voice therapy.



Qualitative Results:

At the beginning of the study, participant 3 rated her voice with a 2 and at the end with a 5.5. Ratings by the other judges were the following:

Participant Ratings	Judge #1	Judge #2	Judge #3	Judge #4	Judges' Average	Participant's Ratings
Pre-Therapy	2	2	2.5	2.5	2.25	2
Post-Therapy	5	5	5	4.5	4.88	5.5

Participant's Overall Comments and Suggestions:

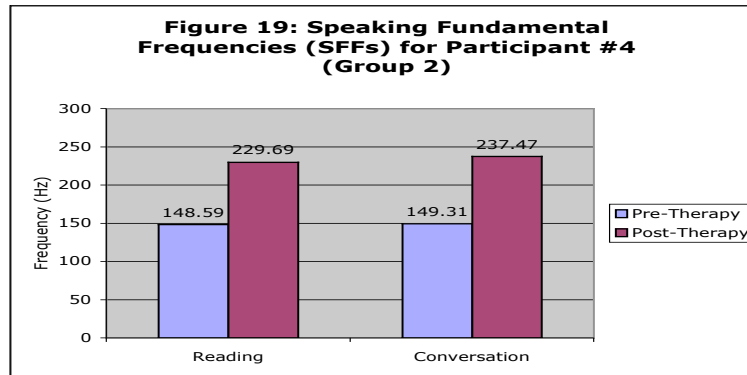
Participant 3 reported that she found the resonance exercises, the feminine language exercises, and the nonverbal exercises to be the most helpful in acquiring a more feminine voice. She reported that she found the resonance exercises to be very helpful in “solving the mystery of vocal forwardness.” Participant 3 also reported that she found the group aspect of therapy to be beneficial since it allowed for positive reinforcement and peer feedback. Some of the comments in the participant’s voice journal include reporting improvement in self-esteem as the therapy progressed as well as reporting difficulties with use of male gestures at the beginning of therapy. Participant 3 had no suggestions for future voice sessions.

Case Study – Participant 4

Participant 4 (Group 2), age 52 years, had received previous voice therapy training at the Speech and Hearing Center of the University of North Carolina at Greensboro for one academic semester. The participant was recruited for the study as a volunteer from a transgender support group in Greensboro, North Carolina. Participant 4 had not undergone sexual reassignment surgery (SRS), and had not been receiving feminizing hormones. The participant did not have a musical background. Participant 4 reported that on the male-to-female transition status, she presented as 70% female and 30% male.

Quantitative Results:

At the beginning of the study, participant 4 presented with speaking fundamental frequencies (SFFs) below the 160-165 Hz frequency range (148.59 Hz during reading and 149.31 Hz during conversation), which has been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). At the end of the study participant 4 presented with SFFs above the 160-165 Hz frequency range (229.69 Hz during reading and 237.47 Hz during conversation). Figure 19 shows the participant's SFF pre- and post- voice therapy.



Qualitative Results:

At the beginning of the study, participant 4 rated her voice with a 3 and at the end with a 6. Ratings by the other judges were the following:

Participant	Judge	Judge	Judge	Judge	Judges'	Participant's
Ratings	#1	#2	#3	#4	Average	Ratings
Pre-Therapy	2.5	2.5	2.5	2	2.38	3
Post-Therapy	3.5	4.5	4	5	4.25	6

Participant's Overall Comments and Suggestions:

Participant 4 reported that she found the resonance exercises and the singing exercises to be the most helpful in helping with acquiring a more feminine voice. She reported that she found the Real Time Pitch (Kay Elemetrics) exercises to be helpful since she could visualize her pitch being in the feminine range. Participant 4 also

reported that she found the group aspect of therapy to be beneficial since it allowed for positive reinforcement and peer feedback. Some of the comments in the participant's voice journal include reporting difficulties with conversational speech vs. reading. She reported that her "pitch drops" when she has to think of what to say instead of reading the words and simply thinking of her pitch and overall quality of her voice. A suggestion expressed by the participant was that during the Real Time Pitch (Kay Elemetrics) approach, the principal investigator could suggest that the participants not working on the computer practice other materials relevant to the session.

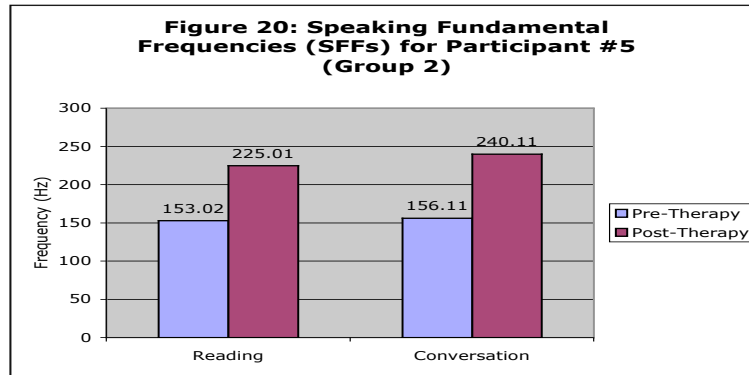
Case Study – Participant 5

Participant 5 (Group 2), age 62 years, had not received previous voice therapy training. The participant was recruited for the study as a volunteer from a transgender support group in Greensboro, North Carolina. The participant had undergone sexual reassignment surgery (SRS) and reported that she had been receiving feminizing hormones. The participant had a musical background in singing. She reported that she enjoyed singing along to recorded music on a daily basis. On the male-to-female transition status, participant 5 presented as 100% female.

Quantitative Results:

At the beginning of the study, participant 5 presented with speaking fundamental frequencies (SFFs) below the 160-165 Hz frequency range (153.02 Hz during reading and 156.11 Hz during conversation), which has been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). At the end of

the study participant 5 presented with SFFs above the 160-165 Hz frequency range (225.01 Hz during reading and 240.11 Hz during conversation). Figure 20 shows the participant's SFF pre- and post- voice therapy.



Qualitative Results:

At the beginning of the study, participant 5 rated her voice with a 3 and at the end with a 5. Ratings by the other judges were the following:

Participant Ratings	Judge #1	Judge #2	Judge #3	Judge #4	Judges' Average	Participant's Ratings
Pre-Therapy	3	2	2.5	3	2.63	3
Post-Therapy	5	5	4	5	4.75	5

Participant's Overall Comments and Suggestions:

Participant 5 reported that she found the resonance exercises, the melodic intonation therapy exercises, and the singing exercises to be the most helpful in helping with acquiring a more feminine voice. She reported that she found the group aspect of therapy to be beneficial since it allowed for positive reinforcement and peer feedback. Some of the comments in the participant's voice journal include reporting difficulties with maintaining of frequencies at or above 160-165 Hz as well as with a legato vocal pattern, identified as more female. A suggestion expressed by the participant was to teach the participants a song with frequencies at or above 160-165 Hz so that the participants would have a reference point for when they speak.

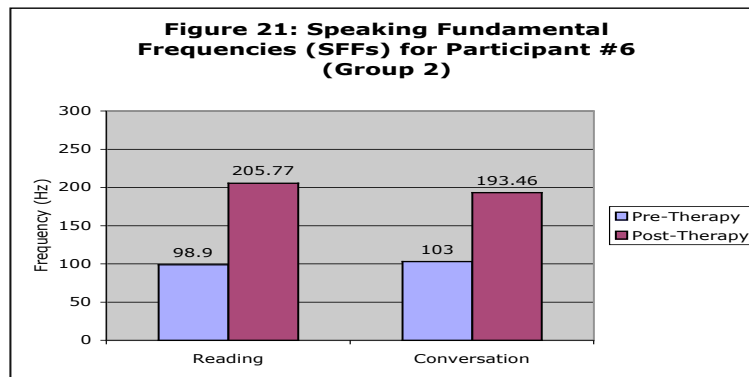
Case Study – Participant 6

Participant 6 (Group 2), age 52 years, had no previous voice therapy. The participant was recruited for the study as a volunteer from a transgender support group in Greensboro, North Carolina. Participant 6 was not on any hormones, and had not undergone sexual reassignment surgery (SRS). Participant 6 had no musical background. On the male-to-female transition status, participant 6 presented as 90% male and 10% female.

Quantitative Results:

At the beginning of the study, participant 6 presented with speaking fundamental frequencies (SFFs) below the 160-165 Hz frequency range (98.80 Hz during reading and 103.00 Hz during conversation), which has been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer &

Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). At the end of the study participant 6 presented with SFFs above the 160-165 Hz frequency range (205.77 Hz during reading and 193.46 Hz during conversation). Figure 21 shows the participant's SFF pre- and post- voice therapy.



Qualitative Results:

At the beginning of the study, participant 6 rated her voice with a 2 and at the end with a 4. Ratings by the other judges were the following:

Participant Ratings	Judge #1	Judge #2	Judge #3	Judge #4	Judges' Average	Participant's Ratings
Pre-Therapy	2	2	2.5	1	1.88	2
Post-Therapy	4	4	3	5	4	4

Participant's Overall Comments and Suggestions:

Participant 6 reported that she found the resonance exercises and the Melodic Intonation Therapy (MIT) exercises to be the most helpful in helping with acquiring a more feminine voice. She also reported that she found the group aspect of therapy to be beneficial since it allowed for peer feedback. A suggestion expressed by the participant was to allow for participants to hear a playback of their pre-test audio recordings during the middle of the therapy program instead of only at the end in order for the participants to compare their current voices to it and thus, gain some insight about progress.

CHAPTER V

DISCUSSION

This study attempted to establish the effectiveness of singing exercises and Melodic Intonation Therapy (MIT) in addition to traditional voice therapy approaches in creating a more feminine sounding voice for male-to-female transgender individuals. In doing this, both qualitative and quantitative measures, with an emphasis on qualitative, as well as helpful aspects of therapy were used. Although this study was inconclusive, the examiner as well as the participants of the study (Group 2) report that singing exercises and Melodic Intonation Therapy (MIT) have been essential in aiding to create a more feminine sounding voice. In general, this study was effective in aiding male-to-female participants gain a more feminine sounding voice.

By the end of the study all six participants demonstrated Speaking Fundamental Frequencies (SFFs) above the 160-165 Hz frequency range, which has been identified by experts as the minimum frequency range for the voice to be identified as belonging to a female (Gelfer & Schofield, Spencer, 1988; Wolfe, Ratusnik, Smith, & Northrop, 1990). Further, all participants presented with self-voice ratings (1-7 scale) that were higher than the ratings given by the participants at the beginning of the study (Figure 11). The voice ratings given by the participants at the end of the study show that the participants' self-perceptions regarding the femininity of their voice were improved since the beginning of the study. At the end of the study, four judges (two first-year speech-language pathology

graduate students and two random volunteers) were asked to rate each of the participant's voice pre- and post- voice therapy. All four judges rated the participants with voice ratings that were above the ratings at the beginning of the study. An exception was noted with participant #2 who presented with frequencies within the 160-165 Hz (frequency range) from the beginning of the study. Little improvement was noted and thus, judges rated the participant's voice with none (3 judges) to limited (.5) (one judge) improvements during voice ratings.

By the end of the study, Group 1 (participants receiving traditional voice therapy plus language structures/vocabulary and nonverbal communication) presented with Speaking Fundamental Frequencies (SFFs) above the 160-165 Hz range. Group 2 (participants receiving traditional voice therapy plus singing exercises and MIT) performed at higher SFFs by the end of the study; however, a significant difference between the two groups was not present. Figure 10 shows the average improvement in SFFs between Group 1 and Group 2.

A number of individual parameters may have influenced the results of this study. These include: Age of the participants, hormone therapy and surgery, previous voice therapy, level on the gender transition status and musical experience.

1. Age

Participant #3 (Group 1) was the youngest participant in age (37 years old). The participant demonstrated the highest gains in SFFs both during reading and conversation. Age, however, may or may not be a contributing factor to the participant's gains. Another example is participant #1 (Group 1) who was the oldest of all participants (63

years old). The participant did not make the least gains in SFFs. Thus, age may or may not have contributed to SFF gains.

2. Hormone Therapy and Surgery

The use of feminizing hormones and sexual reassignment surgery (SRS) do not affect the vocal mechanism (Blaugrund, Isshiki, and Taira, 1992) and thus, they were not expected to be predictors of success. Participant #5 (Group 2) was the only participant considered post-op; however, she did not make the most gains in SFF. Participant #3 (Group 1) made the highest gains in SFF; however, she had not undergone SRS.

3. Previous voice therapy

Although this parameter was thought by the examiner to be a contributing factor for higher gains in SFF, results did not show a correlation of previous voice therapy with higher gains in SFF. Participant #1 (Group 1) and participant #4 (Group 2) had received previous voice therapy; yet they did not make the highest gains in SFF. Participant #3 (Group 1) made the highest gains in SFF; however, she did not receive previous voice therapy.

4. Level on the gender transition status

The degree to which an individual has transitioned to present as a female was also thought by the examiner to be a contributing factor for higher gains in SFF. However, a higher percentage level of femininity on the gender transition status did not necessarily correlate with higher gains in SFF. For example, participant #3 (Group 1) who presented with the highest gains in SFF by the end of the study reported only 10% femininity and

90% masculinity on the transition status. Participant #2 (Group 1) presented with 100% female; however, the participant made the least gains in SFF.

5. Musical experience

Musical experience was thought of to be an important parameter in influencing success with vocal femininity. According to experts, pitch variability or the musicality of the voice pattern are essential to a feminine sounding voice (Andrews, 1999). Even though results were inconclusive, participant #3 (Group 1), who presented with the highest gains in SFF by the end of the study, reported playing the harp on a professional basis.

Anecdotal Evidence

Anecdotal evidence shows that the participant who demonstrated the highest level of improvement (#3-Group 1) also demonstrated the highest level of practice with the vocal exercises. The participant also was the youngest (37 years old) of all the participants, had previous musical experience and entered the program with the lowest fundamental frequency level so there was more “room for improvement.”

Reading and Conversation

Differences were noted when comparing participants’ SFFs during reading and during conversation (Tables 5 and 6). Participants reported having a preference for reading or for conversation while speaking in a feminine manner. Participants who preferred reading reported that they felt more comfortable with written material since they did not have to think of what to say and thus, could concentrate on the femininity of their speech. Participants who preferred conversation reported that they felt as if reading

was “constricting” since it did not allow for use of feminine language and free expression. Participants #1 (Group 1), #4, and #5 (Group 2) presented with higher SFF ratings during conversation and participants #2, #3 (Group 1), and #6 (Group 2) presented with higher SFF ratings during reading. There is no evidence to support SFF differences in reading and conversation by the current literature.

Ratings by Participants

Following therapy, all participants presented with self-voice ratings (1-7 scale) that were higher than the ratings given by the participants at the beginning of the study (Figure 11). Differences in improvement were greater for participants in Group 2 (traditional voice therapy plus singing and MIT) than in Group 1 (traditional voice therapy) by one point. Participant #3 (Group 1) rated herself with the highest difference in pre - and post - therapy voice ratings (3.5 points).

Ratings by Judges

Judges #1 and #2 were first year speech-language pathology graduate students and judges #3 and #4 were non-trained volunteers. No significant differences in voice ratings were noted between the two groups of judges. Judge #1 and #3 rated Group 1 (traditional voice therapy) and Group 2 (traditional voice therapy plus singing and MIT) with equal ratings of improvement. Judges #2 and #4 noted greater improvements in Group 2. Judge #2 noted an improvement of 2 points for Group 2 and judge #4 noted a difference of 5 points for Group 2. Three out of four judges rated participant #2 (Group 1) as having no improvement and judge #4 noted a half (.5) point of improvement for participant #2. Judges #1 and #3 rated participant #3 (Group 1) as having the greatest

improvement out of all participants whereas judge #2 rated participants #3 (Group 1) and #5 (Group 2) as having the greatest improvement and judge #4 rated participant #6 (Group 2) as having the greatest improvement.

Most Helpful Aspects of Therapy

At the end of the study, the participants described aspects of therapy that were the most helpful in acquiring a more feminine voice. All (100%) of the participants reported that they found the group aspect of therapy to be very helpful since it provided for opportunities for positive reinforcement and peer feedback.

All participants (100%) reported that they found the resonance exercises to be very helpful in creating a “forward voice” and tone focus. Two (33.33%) participants reported finding the feminine language exercises to be helpful and two (33.33%) reported finding the Real Time Pitch (Kay Elemetrics) exercises to be helpful in acquiring a feminine voice. Two (33.33%) participants reported finding the singing exercises to be helpful and two (33.33%) reported finding the Melodic Intonation Therapy (MIT) exercises to be helpful.

Least Helpful Aspects of Therapy and Suggestions

At the end of the study, the participants also described aspects of therapy that were least helpful in acquiring a more feminine voice. All (100%) of the participants felt that none of the therapy approaches chosen during therapy were “least helpful;” however, they had a few suggestions for future sessions and/or participants. The main suggestions expressed by the participants include the following:

- At the middle of the entire therapy program (around 6 weeks), the participants should hear a playback of the their pre-therapy audio recordings in order for them to compare their current voices to it and thus, gain some insight about progress.
- During the individual Real Time Pitch (Kay Elemetrics) activities, the participants not working on the computer should practice other materials relevant to the session.
- The principal investigator could teach the participants a song with frequencies at or above 160-165 Hz so that the participants would have a reference point for when they speak.

Implications for Future Research

Because there is lack of research addressing the voice treatment approaches for male-to-female transgender individuals as well as a limited number of participants, it would be helpful to replicate this study. In addition, the following design characteristics should be considered:

- What is the Maximum Phonation Range (MPR)?
- What are the results at the middle of therapy (6 weeks)?
- What if songs were taught in addition to singing exercises? Would there be more benefits seen in Group 2?
- What happens to male-to-female transgender individuals who receive traditional voice therapy in combination with singing exercises and Melodic Intonation Therapy (MIT) after the end of therapy? Can they maintain their new feminine sounding voice in their daily lives better than

male-to-female transgender individuals who receive traditional voice therapy alone?

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APPENDIX A
DSM-IV & THE HARRY BENJAMIN'S INTERNATIONAL GENDER
DYSPHORIA ASSOCIATION

I. DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition)

1. Standards of Care for Gender Identity Disorders, Sixth Version

It should be noted that the American Psychiatric Association's (2000) *Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition - (DSM-IV)* lists variations in gender presentation as Gender Identity Disorders. The main gender variation described under the category of Gender Identity Disorders is Gender Identity Disorder. The following is a description of Gender Identity Disorder as it is presented in the DSM-IV.

2. Gender Identity Disorder

Diagnostic Features

The DSM-IV describes Gender Identity Disorder as a strong and persistent cross-gender identification, which is the desire to be, or the insistence that one is, of the other sex. This cross-gender identification must not merely be a desire for any perceived cultural advantages of being the other sex but must also be persistent discomfort about one's assigned sex or a sense of inappropriateness in the gender role of that sex. The diagnosis is not made if the individual has a concurrent physical intersex condition, such as partial androgen insensitivity syndrome or congenital adrenal hyperplasia. To make the diagnosis of Gender Identity Disorder there must be evidence of clinically significant distress or impairment in social, occupational, or other significant areas of functioning.

Adults with Gender Identity Disorder are preoccupied with their wish to live as a member of the other sex. This preoccupation may be manifested as an intense desire to adopt the social role of the other sex or to acquire the physical appearance of the other sex through hormonal or surgical manipulation. Adults with this disorder are uncomfortable being regarded by others as, or functioning in society as, a member of their designated sex. To varying degrees, they adopt the behavior, dress, and mannerisms of the other sex. In private, these individuals may spend much time cross-dressed and working on the appearance of being the other sex.

3. Associated Features and Disorders

Many individuals with Gender Identity Disorder become socially isolated. The mental lives of some individuals revolve only around those activities that lessen gender distress. They are often preoccupied with appearance, especially early in the transition to living in the opposite sex role. Relationships with one or both parents also may be seriously impaired. Some males with Gender Identity Disorder resort to self-treatment with hormones and may very rarely perform their own castration or penectomy. Especially in urban centers, some males with the disorder may engage in prostitution, which places them at a high risk for human immunodeficiency virus (HIV) infection. Suicide attempts and substance-related disorders are commonly associated.

Children with Gender Identity Disorder may manifest coexisting Separation Anxiety Disorder, Generalized Anxiety Disorder, and symptoms of depression. Adolescents are particularly at risk for depression and suicidal ideation and suicide attempts. In adults, anxiety and depressive symptoms may be present.

4. Physical Examination Findings and General Medical Conditions

Individuals with Gender Identity Disorder have normal genitalia in contrast to the ambiguous genitalia found in physical intersex conditions. Adolescent and adult males with Gender Identity Disorder may show breast enlargement resulting from hormone ingestion, hair denuding from temporary or permanent epilation, and other physical changes as a result of procedures such as rhinoplasty or thyroid cartilage shaving (surgical reduction of the Adam's apple). Distorted breasts or breast rashes may be seen in females who wear breast binders. Post surgical complications in genetic females include prominent chest wall scars, and in genetic males, vaginal strictures, rectovaginal fistulas, urethral stenoses, and misdirected urinary streams. Adult females with Gender Identity Disorder may have a higher-than-expected likelihood of polycystic ovarian disease.

5. Specific Age and Gender Features

Females with Gender Identity Disorders generally experience less ostracism because of cross-gender interests and may suffer less from peer-rejection, at least until adolescence. In child clinic samples, boys with this disorder are referred for evaluation more frequently than are girls. In adult clinic samples, men outnumber women by about two or three times. In children, the referral bias toward males may partly reflect the greater stigma that cross-gender behavior carries for boys than for girls.

II. The Harry Benjamin's International Gender Dysphoria Association's Standards of Care for Gender Identity Disorders, Sixth Version

Harry Benjamin, M.D., (1885-1987) is best known in the field of sexology for his unprecedented work with transvestites and transsexuals. His involvement in transvestism and transsexualism was inspired by the work of Magnus Hirschfeld, a famous German sexologist who in 1918 reported the first sex reassignment surgery having taken place in Berlin in 1912 and who in 1923 coined the term *transsexualism*. Dr. Benjamin agreed with Hirschfeld that transsexuals were a form of neurological intersex. He emerged quickly as the American leader in the sexological field and in 1966 published the seminal book *The Transsexual Phenomenon*. In his book Dr. Benjamin provided explanations about transvestism, transsexualism, and homosexuality, sex and gender, possible etiologies of transsexualism, surgical and nonsurgical management of transsexualism, as well as legal aspects of transvestism and transsexualism.

In order to qualify for sex reassignment surgery (SRS) in the United States and abroad, an individual must meet the standards of care established in 1979 by the Harry Benjamin International Gender Dysphoria Association (HBIGDA). These standards were established to help professionals treating transsexuals to provide a minimum set of guidelines to be met before clients proceed with hormone therapy, and, ultimately, sex reassignment surgery. The standards of care (Brown & Rounsley, 1996) are as follows:

- The person must have been under the care of a therapist for at least one year.
- The person must have been properly diagnosed as gender dysphoric.

- The person must have completed a real-life test by living in the opposite gender for at least one year.
- The person must receive a written referral from her primary therapist and a second referral from a clinician other than the therapist. At least one of the two therapists must hold a PhD or MD.
- The person must be in good physical health.

The following is a description of the Standards of Care Introductory Concepts.

1. *The Purpose of the Standards of Care*

The major purpose of the SOC is to articulate a professional consensus about the psychiatric, psychological, medical, and surgical management of gender identity disorders.

2. *The Overarching Treatment Goal*

The general goal of psychotherapeutic, endocrine, or surgical therapy for persons with gender identity disorders is lasting personal comfort with the gendered self in order to maximize overall psychological well-being and self-fulfillment.

3. *The Standards of Care are Clinical Guidelines*

The SOC are intended to provide flexible directions for the treatment of persons with gender identity disorders. When eligibility requirements are stated, they are meant to be minimum requirements. Individual professionals and organized programs may modify them. Clinical departures from these guidelines may co-occur because of a patient's unique anatomic, social, or psychological situation, an experienced professional's evolving method of handling a common situation, or a research protocol.

These departures should be recognized as such, explained to the patient, and documented both for legal protection and so that the short and long term results can be retrieved to help the field to evolve.

4. The Clinical Threshold

A clinical threshold is passed when concerns, uncertainties, and questions about gender identity persist during a person's development, become so intense as to seem to be the most important aspect of a person's life, or prevent the establishment of a relatively unconflicted gender identity. The person's struggles are then variously informally referred to as a gender identity problem, gender dysphoria, a gender problem, a gender concern, gender distress, gender conflict, or transsexualism. Such struggles are known to occur from the preschool years to old age and have many alternate forms. These reflect various degrees of personal dissatisfaction with sexual identity, sex, and gender demarcating body characteristics, gender roles, gender identity, and the perceptions of others. When dissatisfied individuals meet specified criteria in one of two official nomenclatures - the Diagnostic and statistical Manual of Mental Disorders - Fourth Edition (DSM-IV) or the International Classification of Diseases - 10 (ICD-10) -, they are formally designated as suffering from a gender identity disorder. Some persons with gender identity disorder exceed another threshold: They persistently possess a wish for surgical transformation of their bodies.

5. Two Primary Populations with Gender Identity Disorder (GID) Exist - Biological Males and Biological Females

The sex of a patient always is a significant factor in the management of GID. Clinicians need to consider separately the biologic, social, psychological, and economic factors of each sex. All patients, however, should follow the SOC.

APPENDIX B

TERMINOLOGY

According to Andrews, 1999, it is essential for helping professionals, such as speech-language pathologists, psychologists, social workers, and counselors, to be familiar with terminology used to describe variations in gender expressions. The following descriptions are taken from Andrews, (1999):

Male/Female - Biological categories with membership assigned on the basis of criteria such as chromosomal pattern and genitalia.

Masculinity/Femininity - Gender terms descriptive of qualities and characteristics that are based on conventions prevalent in a particular society or culture. It is generally believed that biological males may demonstrate some “feminine” qualities, and biological females may exhibit some “masculine” traits.

Sexual Preference/Orientation - A construct not necessarily aligned with an individual’s biological make-up or gender expression (Money, 1988). Sexual preference/orientation is an individual’s desire to be sexually involved with a male or a female.

Gender Expression - Refers to males expressing their femininity and females expressing their masculinity as well as females expressing their femininity and males expressing their masculinity.

Gender Presentation - Refers to gender expression as well as a strategy such as cross-dressing or use of gender props to aid in gender expression (Stevens, 1990).

Gender Dysphoria - This term connotes discomfort with one's socially and culturally assigned gender role.

Sexual Dysphoria - This term refers to discomfort with one's biological make-up or sex.

Transvestite - The term describes men who like to dress in women's clothing. It implies a relationship between erotic desire and dressing.

Cross-Dresser - Refers to both males dressing as females and females dressing as males. Describes gender presentation and is an inclusive term (i.e., it is used to refer to anyone who cross-dresses for whatever reason and it is considered nonjudgmental). It is estimated that 3 to 5% of heterosexual men in our society engage in cross-dressing activities of some kind.

Drag - A vernacular term meaning "dressed as a girl." It is predominantly a theatrical term and suggests a showy, exotic, or high glamour image. Dressing in drag does not signal a person's sexual preference or inclination for full-time cross-dressing.

She-Male - Usually a gay male who lives full time as a woman or, in other words, a gay transgenderist.

Female Impersonators/Impressionists - Professional entertainers who perform "in drag."

Transgenderist/Transgender - A broad term meaning that a person of one sex lives full time in another gender role (cross-living).

Transsexual - This term denotes someone who feels that his or her gender identity is fundamentally and irrevocably incompatible with his or her sexual or biological make-up.

Androgyne - This term derives from the Greek *andro*, meaning man, and *gyne*, meaning woman. It is a sociological term meaning harmonious balance between the expression of both masculine and feminine qualities within the same individual.

Hermaphrodite - A biological term indicating that physical characteristics of both sexes are present in one individual.

APPENDIX C

BRIEF ANATOMY OF VOICE PRODUCTION

It is essential for speech-language pathologists working with transgender clients as well as for the clients themselves to be familiar with anatomical terminology in order to better treat the clients' voice problem. The following descriptions are taken from Seikel, King, & Drumright (2000).

Phonation - Also called voicing (sound produced by phonation), phonation is the product of vibrating vocal folds within the larynx.

Larynx - The larynx is a musculo-cartilaginous structure located at the upper end of the trachea, being comprised of the cricoid, thyroid, and epiglottis cartilages, as well as the paired arytenoid, corniculate, and cuneiform cartilages. The larynx has two major functions: 1) biological and 2) phonatory. In its biological function, the larynx protects the airway from foreign materials during breathing and swallowing. In its phonatory function, the larynx provides the vibratory power for speech. According to Swartz (2004), linguistic (vocal stress, prosody, and intonation) and suprasegmental (pitch, loudness, and resonance) properties and patterns of speech are also functions of the larynx. These are complex functions that are mostly determined by the larynx's posture, tension, and airflow.

Vocal Folds - Otherwise referred to as vocal cords, these structures are located within the airway at the superior end of the trachea. As the air stream passes between the adducted vocal folds, they are made to vibrate. The vocal folds are composed of five layers of tissue, with the deepest layer being muscle. On average, men have a 60% longer vocal

fold length than women, which accounts for the difference in fundamental frequency between the sexes.

According to Jackson and Jackson (1937) the vocal folds have basically nine different functions. These are as follows:

- Respiratory: this serves in regulating carbon dioxide in the blood.
- Valvular: a control that affects positive and negative pressure in the lungs; these in turn have an effect on pulmonary circulation.
- Fixative: stabilizes the thorax for efficient arm movement.
- Protective: serves to prevent anything other than air from entering the air passages.
- Deglutitory: closes off the airway so that no food or liquid can enter the lungs when you swallow.
- Tussive: the coughing that repels foreign bodies and keeps them from entering the larynx.
- Expectorative: clears the passage of secretions and inflammatory products from below the glottis level. (In other words it clears your throat.)
- Emotional: creates reflexive sounds such as crying, laughing, moaning, and so on. These sounds are considered phonatory, a continuous and even vibrating of the vocal folds, unlike a cough.
- Phonatory: this is the voluntary use of sound as means of communication.

Respiration - Respiration is an essential process for voicing. Defined as the exchange of gases between an organism and its environment, respiration is the process of inspiration

(breathing in) and expiration (breathing out). The rib cage, made up of the spinal column and ribs, houses the lungs, which are the primary mechanisms of respiration. Air is drawn into the lungs through muscular effort. The diaphragm contracts during inspiration and as a result the lungs expand. Accessory muscles also provide added expansion of the rib cage for further inspiration. Expiration, on the other hand, may occur passively through the forces of tongue, elasticity, and gravity acting on the ribs and rib cage.

APPENDIX D

PRETEST INTERVIEW QUESTIONS

1. On a scale of 1 to 7, 1 being a very masculine voice and 7 being a very feminine voice, rate your voice.

Masculine Voice

Feminine Voice

1 2 3 4 5 6 7

2. Are you taking any medications/hormones?
3. Have you had, or are planning to have, sexual reassignment surgery?
4. Have you had voice therapy in the past to feminize your voice?
5. What kind of social experiences/transition status are you having? (e.g., 60% in the feminine role and 40% in the masculine role).

APPENDIX E
VOICE EVALUATION FORM

Participant #:

Age:

PRETEST DATA:

Session #:

Habitual Pitch

A. Average fundamental frequency during reading _____ Hz

B. Average fundamental frequency during conversation _____ Hz

POSTTEST DATA:

Session #:

Habitual Pitch

A. Average fundamental frequency during reading _____ Hz

B. Average fundamental frequency during conversation _____ Hz

APPENDIX F

SUGGESTED ORGANIZATION OF WEEKLY SESSIONS

Note:

1. For Group 1: Starting on *Week 3*: Practice language structures/vocabulary and nonverbal communication for 15 minutes.
2. For Group 2: Starting on *Week 3*: Practice singing exercises and Melodic Intonation Therapy (MIT) (see *Appendix I*, Sections G and H) for 15 minutes.
3. For Group 1 and Group 2: Starting on *Week 2*: Voice journals (see *Appendix I, Section I*) will be assigned with each homework assignment.

Week 1 (same for both groups) -

1. Complete consent forms and permissions
2. Conduct individual interviews
3. Complete voice evaluations

Week 2 (same for both groups) -

1. Introduce vocal hygiene, correct posture, correct breathing techniques, and relaxation
2. Introduce anatomy and physiology of the vocal mechanism
3. Introduce resonance exercises
4. Assign homework

Week 3 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Introduce Real Time Pitch (Kay Elemetrics) and Gelfer's Steps (1-3)

3. Introduce use of “Head Voice” and Intonation Exercises
4. Assign homework

Week 4 -

1. Check posture, breathing, relaxation, resonance, and intonation exercises
2. Real Time Pitch (Kay Elemetrics) and Gelfer’s Steps (4)
3. Introduce vowel prolongation exercises
4. Assign homework

Week 5 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Introduce easy vocal onsets, breathiness and loudness issues
3. Real Time Pitch (Kay Elemetrics) and Gelfer’s Steps (5)
4. Assign homework

Week 6 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Practice vowel prolongations, intonation exercises, and easy vocal onsets
3. Introduce legato phrasing (phrase level)
4. Assign Homework

Week 7 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Begin role-play discussions
3. Incorporate pitch/pitch variability, resonance, breathiness, and vowel prolongations

4. Assign homework

Week 8 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Begin carryover exercises (telephone conversations with faculty)
3. Assign homework

Week 9 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Continue role-play discussions and conversation analysis
3. Begin carryover exercises outside of the clinic room
4. Assign homework

Week 10 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Continue carryover exercises outside of the clinic room
3. Assign Homework

Week 11 -

1. Check posture, breathing, relaxation, and resonance exercises
2. Review techniques
3. Assign Homework


Week 12 (same for both groups) -


1. Final interviews and voice evaluations
2. Review Homework/Client Progress/Obtain client feedback


3. Discharge (Provide reassurance, review strengths, and encourage positive changes).


APPENDIX G

SINGING EXERCISES

1. 
Mm _____ Mm _____ Mm _____ Mm _____ *etc.*

2. 
Mee- oh mee-oh mee. Mee-oh mee-oh mee. Mee-oh mee-oh mee. *etc.*


3. 
Noo _____ Noo _____ *etc.*

4. 
Noo - ee noo - ee noo _____ Noo - ee noo - ee *etc.*

APPENDIX H


MELODIC INTONATION THERAPY (MIT) EXERCISES

1. 
He - llo

2. 
Good mor - ning

3. 
Good bye ____


4. 
Good ni - ght


5. 
How are ____ you?


6. 
I'm fee - ling fine.


7. 
Ex - cuse me!

8. 
Thank you so much!

9. 
It was nice mee- ting you.

10. 
See you soon ____.

11. 
May I have some co-ffee?

12. 
Would you like some co-ffee?

13. 
Yes, please.

14. 
No ____ thank you.

15. 
I lo-ve to sing!

16. 
Oh no ____!

17. 

How aw - ful!

18. Could you be-lieve that?

19. Musical notation for the phrase 'How won - der - ful!'. It consists of a single treble clef staff with a key signature of one sharp (F#). The melody is: G4 (quarter), A4-B4 (beamed eighth notes), C#5 (quarter), D5 (quarter), and E5 (half). The staff ends with a double bar line.

How won - der - ful!

20. What a gor - geous dress!

APPENDIX I

VOICE JOURNAL

Week 1 - Week 12

1. Therapy Experiences
2. Progress
3. Difficulties
4. Observations (regarding feminine speech)
5. General Comments

APPENDIX J

DIAPHRAGMATIC BREATHING EXERCISES

According to Swartz (2004), it is important to use the diaphragm to breathe for many reasons:

1. Ability to reach higher total lung volumes and inhalation of more air.
2. Support and control of air by the diaphragm reduces the need for laryngeal control of airflow.
3. Improvement of relaxation of the larynx, since diaphragmatic breathing does not involve active chest or clavicular movement.

Instructions:

1. Lie on your back.
2. Place a book on your diaphragm.
3. Place one hand on the book and one hand on your chest.
4. Raise the book as you breathe in without raising your chest.

APPENDIX K

GELFER'S STEPS IN VOICE THERAPY FOR TRANSGENDER CLIENTS

(AJSLP, vol.8, p.201-208, August, 1999)

1. Selecting a target pitch (160-165 Hz)

- Client produces various frequencies on the syllable /ma/
- Client attempts a higher pitch on /ma/ (higher than 165 Hz)
- Clinician models a 5-note ascending scale (do, re, mi, fa, sol) on /ma/ for client to model beginning at E3 (165 Hz): then at F3 (175 Hz) and 1 more semitone upward if client is successful; then select the semitone on which the client has greatest upward movement with good quality as the target pitch.

2. Habituating the target pitch in syllables

- Client practices producing the target pitch on a variety of /m/ -initiated CV syllables lasting 2 to 3 seconds each
- Client practices strings of 2 to 5 /m/ -initiated syllables using breath support and correct breathing patterns.
- Client continues vocal flexibility exercises by producing the ascending 5 note scale on the syllable /ma/, beginning on the target pitch level. A combination ascending-descending scale can also be tried.

3. Words: Chanting and Speech Intonation

- Clinician introduces “chanted” words first (/m/ -initiated) using a pitch pipe and a vocal model, and chant a stimulus word at client’s target pitch. The client should

imitate with the same flat Visi-Pitch trace as the clinician. The client should be successful at chanting a list of words before the next step.

- Clinician models same words using a slightly exaggerated rising-falling intonation pattern, prolonging the initial /m/ at the target pitch, then raising her pitch 1 semitone, and then dropping her pitch to one semitone below the target as she ends the word. The Visi-Pitch should show this upward-downward movement. The client should follow the same procedure. If she has poor breath quality, she is reminded to take a good breath first and to allow the highest part of the intonation contour to become more breathy.
- Clinician introduces other phonemic contexts (first words beginning with /n, w, j, l, r/, then voiced fricatives, affricates, and stops) and then alter the level of propositionality (e.g., by reading word lists, then moving to activities with more linguistic formulation, such as filling in missing words of a sentence or answering questions with single word responses). Practice single words that client uses frequently, e.g., hello, bye, OK, yes, no.

4. *Phrases*

- Clinician models /m/ -initiated words at the beginning of each phrase; then go to other voiced continuants /n, w, j, r/ to initiate phrases; continue to use Visi-Pitch feedback; after the client reads phrases until she maintains the targeted pitch and acceptable voice quality, increased propositionality by using a partial phrase client repeats and completes or asking client questions that can be answered with a phrase.

- Clinician increases focus on intonation, discouraging a monotone pattern and excessive pitch shifts, concentrating on naturalness of variability. Providing context to the client regarding the motivation behind the utterance can facilitate naturalness.
- Clinician moves to functional communication skills as soon as possible by practicing phrases used frequently in the home or work. Once these phrases can be said easily in her feminine voice, with good quality and intonation, they can be used at home or work for carry-over.

5. *Sentences*

- At this level address pitch, quality, intonation, and pitch range. The client is expected to control these areas and the clinician monitors, paying special attention to ensure that declarative sentences end with falling intonations more often than rising intonations. The approximate pitch range is approximately 140-300 Hz.
- As the client becomes more confident and capable at the sentence level, the use of the Visi-Pitch is faded.
- Sentences should express happiness, sorrow, annoyance, anger, and other emotions so the client can experiment with such expressions using her feminine voice.
- Clinician increases propositionality just as you did at the phrase level. You can present partial sentences for client to repeat in complete form, several related words for client to make up a sentence about, single or unrelated to serve as the

topic of a sentence, picture descriptions, responses to questions and role-playing activities.

- Clients may have difficulty paying attention to what they are trying to say as well as how they are saying it. You will spend a lot of time at this level of increased propositionality.

APPENDIX L

VOWEL PROLONGATION EXERCISES

Instructions: Read the following sentences and prolong the underlined vowels.

Prompts

Responses

- | | |
|--|---|
| 1. "That is marvelous news!" | 1. "It's <u>ju</u> st <u>incred</u> ible!" |
| 2. "Can you believe she wore that dress!" | 2. "You've <u>go</u> t to be <u>kid</u> ding!" |
| 3. "His youngest child just dropped out of school!" | 3. " <u>Oh</u> <u>no</u> !" |
| 4. "I just won ten thousand dollars in the lottery!" | 4. "Th <u>a</u> t's <u>fab</u> ulous!" |
| 5. "I had to tell her she couldn't come if she was
going to bring him!" | 5. "Y <u>ou</u> <u>di</u> dn't!" |
| 6. "She has a wonderful sense of style!" | 6. "She <u>re</u> ally <u>do</u> es!" |
| 7. "The food at this party is just delicious!" | 7. "It's <u>absol</u> utely <u>mar</u> velous!" |
| 8. "Don't tell me you can't come tonight!" | 8. "I'm <u>so</u> sorry, but I <u>ju</u> st can't!" |
| 9. "You can't really mean that!" | 9. "I'm <u>ser</u> ious!" |
| 10. "Someone should tell her not to wear
that dress to the office!" | 10. "You are <u>so</u> right!" |

APPENDIX M

EASY VOCAL ONSET AND LEGATO SPEECH EXERCISES

Instructions: Practice the following words Practice the following words going from left to right. Try to make the initiation of the word with the vowel as easy as the word which begins with the “h.”

Hall	All
Heat	Eat
Hair	Air
His	Is
Hi	I
Here	Ear

Blend these words together. Maintain an “easy connection” between the words.

Was-open	Cheer-up
Choose-any	All-eager
He’s-acting	Warm-ocean
I’m-angry	It’s-easy
She’s-under	Eats-ice

Practice these pairs. Insert a “y” or a “w” sound between the vowels.

I oppose	Two others
I understand	He eats
You alternate	The egg
Three inches	You answer
Easy Exercise	She argues

Now blend the words in these longer sentences.

1. At what time should I arrive?
2. The equator is an imaginary circle around the earth.
3. Equilibrium is a state of balanced adjustment.
4. If you are an actor, you are almost always anxious.
5. Use another exit if you are expecting excess traffic.

APPENDIX N

BREATHINESS EXERCISES

Research shows that some women speak with incomplete closure of the vocal folds, something which produces breathiness and which is viewed as normal for women, but far less likely to occur in men (Biever, & Bless, 1989; Sodersten, Hertegard, & Hammarberg, 1995). According to Klatt, & Klatt, 1990; Sulter, & Peters, 1996, female voices are perceived as breathy more often than male voices.

Instructions: Read the following words and sentences with excess airflow, especially on words beginning with /h/.

List of Words:

1. Hello
2. Happy
3. Heart
4. Home
5. High
6. Heels
7. Health
8. Humor
9. Harmony
10. Humidity

List of Sentences:

1. Hello, how are you?
2. How marvelous of you to do that!
3. Humor is healthy.
4. Haven't we met before?
5. Her hair is so beautiful!
6. I love to wear high heels!
7. Home is where the heart is.
8. Have a very happy birthday!
9. Have you been married before?
10. Halloween is my favorite holiday.

APPENDIX O

RESONANCE EXERCISES

The exercises given below are used to establish the optimal pitch level and the proper tone focus (Cooper, 1973).

1. Key word and number exercises:

- Say “um-hum one, um-hum two” to ten, with the number on the same pitch level as the “um-hum.” Matching the pitch level of the number to the “um-hum” is more difficult than might be expected. The “um-hum” said with the mouth closed utilizes the natural tone focus; the number said with the mouth opened reverts to the old habitual pitch level, which the patient must avoid.
- Say “nim-nim one, nim-nim two” to ten, again matching the “nim-nim” and the number in pitch and tone focus.
- Use “me-me one, me-me two” to ten, as above.

2. After the key word and number exercises, the next step is to carry over the pitch level and tone focus into phrases or brief sentences.

- Have the client say, “me-me one, how are you?” “Me-me two, I’m fine.” “Me-me three, what time is it?” “Me-me four, who said that?” The client uses any phrases he/she wishes, as well as any key word, such as “me-me” or “nim-nim.”

Combining the key word and number exercises with the phrase gives the client a reference point to transfer the pitch and tone focus to longer sentences.

- The client says the key word with the phrase, eliminating the number, such as “Me-me, I feel fine.” “Me-me, it is nice today.” Again, any key word may be used, but the key word then remains the same throughout the exercise. Any phrase or brief sentence may be used.
 - The client continues the above exercise, switching to another key word. If he/she used “me-me,” he/she may now change to “nim-nim” or “hello.” The key words have different vowel sounds, and thus, afford practice on various vowels and a carry-over of the pitch and tone focus from one vowel to another.
3. The client next practices longer sentences. He/she again says the key word prior to reading the sentence. He/she uses the same key word for a series of sentences and then changes to a new key word for the next group of sentences.
 4. The client speaks spontaneously in sentences, saying a key word before, during, or after each sentence.
 5. The client reads aloud from magazines with the pitch and tone focus being monitored by the patient and the therapist.
 6. The client talks spontaneously to the therapist, who routinely reminds the client if the pitch and tone focus are incorrect.
 7. The client has been attempting since the beginning of therapy to use the new pitch level in the therapy session and outside the therapy session. The final step is a carry-over of the correct pitch level and tone focus in all situations.

Note: The key words, especially “um-hum,” may be used in all situations as a reminder of the proper pitch level and tone focus. This word is said spontaneously as if the client

were acknowledging a comment or agreeing with what was said. Since the “um-hum” is socially acceptable, it can be used unobtrusively in conversation as a therapeutic maneuver.

APPENDIX P

LANGUAGE STRUCTURES AND VOCABULARY EXERCISES

I. Underlying Goals of Communication

1. Men use conversation mostly as a means of exchanging factual information. They like to maintain control over the topic of conversation.
2. Women focus more on the importance of relationships. They use conversation as a means of getting information as well as establishing rapport. Women usually convey more details and feelings than men.

II. Indirect Communicative Strategies

1. *Women* tend to use language differently than men to meet their needs. Often, women use questions to express their needs in an indirect way. Some examples include:
 - “Are you hungry?” rather than “I’d like something to eat.”
 - “Are you hot?” rather than “I’d like to turn down the heat.”

III. Tentative Language and Inclusive Pronouns

1. Women use tentative language, words of uncertainty in everyday conversational speech. Some examples include:
 - “I *think* I want a dress like the one in the window.”
 - “*May be* I’ll come with you to the store.”
2. Inclusive pronouns are often present in feminine language structure. Some examples include:
 - “You should come to the luncheon with *us*.”

- “*We* love going to the park.”

IV. Tag Questions

1. Tag questions are used to maintain a conversation and to show interest in what the speaker is saying. Some examples include:

- “It’s lovely, *isn’t it?*”
- “You’ll come, *won’t you?*”

V. Increased Elaboration, Adjectives, and Adverbs

1. Increased elaboration, adjectives, and adverbs are often present in feminine language structure. Some examples include:

- “My parents have an *attractive, two-story, red brick* house.”
- “Their new puppy is all *black, energetic, and absolutely adorable.*”

VI. Increased Use of Apologies and Socially Polite Words

1. Increased use of apologies, and socially polite words are often present in feminine language structure. Some examples include:

- “I’m *sorry* to hear that.”
- “*Thank you* so much!”

VII. Vocabulary Differences

1. Men are less descriptive and more concise than women. Some examples of vocabulary used by men include: “let’s eat,” “blue,” “fast,” etc.

2. Women are more descriptive and they elaborate frequently. Some examples of vocabulary used by women include: “gorgeous,” “wonderful,” “turquoise blue,” etc.

APPENDIX Q

NONVERBAL COMMUNICATION EXERCISES

Nonverbal communication includes every component of communication other than words themselves. Nonverbal behaviors include visual cues, such as appearances and gestures, and environmental factors, such as use of space and body position. All of these aspects affect messages conveyed through communication. Following is a list of stereotypically observed nonverbal behaviors that differ between men and women:

- Women tend to express their emotions more openly (e.g., laughing, crying).
- Women tend to exhibit more listening/attending behaviors during conversation (e.g., eye contact and head nodding).
- Women tend to use more gestures and movements to emphasize their statements.
- Women tend to touch themselves (e.g., playing with a necklace, tugging at earrings, playing with their hair).
- Women also tend to touch their conversational partners to express support, affection, agreement, and comfort.
- Women tend to move their heads while speaking and while listening to their conversational partner.
- Women tend to sit more closely to their conversational partners.
- Women tend to use a wide range of facial expressions to convey their emotions.
- Women tend to stand in an “S-Shape” form while men tend to stand in an “A-Shape” form.

APPENDIX R

POSTTEST INTERVIEW QUESTIONS

1. On a scale from 1 to 7, 1 being a very masculine voice and 7 being a very feminine voice, rate your voice as it is now.
2. Which aspects of therapy do you think have helped you the most in acquiring a more feminine voice and manners?
3. Which aspects of therapy do you think have helped you the least in acquiring a more feminine sounding voice and manners?
4. Do you think that you have benefited from the group aspect of therapy? If yes, how? If not, why not?
5. What overall suggestions and/or comments would you like to make that you believe would help improve the voice therapy sessions?

APPENDIX S

THE RAINBOW PASSAGE

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long, round arch, with its path high above, and its two ends apparently beyond the horizon.

APPENDIX T

LIST OF VOICE SAMPLES FROM AUDIO RECORDING

1. Pretest (Participant #6)
2. Posttest (Participant #6)
3. Male #1
4. Female #1
5. Pretest (Participant #5)
6. Posttest (Participant #5)
7. Female #2
- 8. Male #2**
9. Pretest (Participant #2)
10. Posttest (Participant #2)
11. Pretest (Participant #4)
12. Posttest (Participant #4)
13. Pretest (Participant #3)
- 14. Posttest (Participant #3)**
15. Pretest (Participant #1)
16. Posttest (Participant #1)
17. Male #3
- 18. Posttest (Participant #3)**
19. Female #3
- 20. Male #2**